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PICKS and SHOVELS

By O. E. POTTER

"Diversion" Is Wrong Word For Raid On Highway Funds

Hundreds—perhaps thousands—of men in all parts of the country are trying to "find a word."

They are looking for a single word that can be used to describe activities under which approximately $200,000,000 in tax proceeds are being used each year for purposes other than those for which the money was collected.

Those activities, relating to proceeds of gasoline taxes and other special levies placed upon owners and users of automobiles, until now have been described by the word "diversion."

But "diversion" means golf, the movies, a game of bridge, or something else of the sort to just about everybody.

And those who know the truth about the extent of misappropriation of money paid by motorists—money raised to build and maintain highways—think the annual "grab" of a fifth of a billion dollars is anything but entertaining.

So they are looking for a word.

—*Highway Highlights.*

Perhaps the Greeks had a word for it, but it's up to us Americans not only to find the word for it (misappropriation seems to describe it rather accurately) but also to put a stop to it.

Gunnision County, Colorado, might qualify for a place in anybody's "Believe It or Not," according to *The Look-Around*. Harry Grubb, county auto driver examiner had to go to town on horse-back for several days last March because the mile and a half of road from the court house to his home was snowed in too deep for an automobile, no matter how accurately its driver might pass one of Harry's examinations.

Early and provident fear is the mother of safety.

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C. & E. M. Photo

Accuracy in Stone Spreading on This West Virginia Job Was Checked by the 70-Foot Cord Seen at the Left

Salt Treatment For Country Road

Waste Material from Nearby WPA Work Economical Provided Wash-Resistant Road Surface

IF IT had been a woman, it would have been "intuition" but since it was an engineer whose passing observation resulted in the saving, it was just "good common sense." The Assistant Construction Engineer in District 8-0 in Pennsylvania who supervised the rebuilding of a section of Route 21-074, northwest of Harrisburg, frequently drove by a WPA project where relief workers were widening slopes on a road 3 miles from his job. His observation of the character of the material saved the

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Road-Mix Retread 3,300 Feet Above Sea In West Virginia

(Photos on page 52)

LEADING south from the town of Davis, W. Va., once a thriving community with two large lumber mills, but now supported chiefly by Federal relief, an interesting 6.4-mile retread contract was completed last summer by the Keeley Construction Co. of Clarksburg, W. Va. This PWS Project 867 consisted of a 130-pound road-mix surface 18 feet wide, on a native stone base laid in 1935 by prison labor. This particular project is of interest because it is typical of West Virginia road-mix projects as regards specifications, and also because of the contractor's equipment and methods which permitted daily runs of 9,000 feet of completed road-mix, including hauling and spreading the stone, dry mixing, two applications of tar with a run of the retread machine after each, and rolling.

Stone and Tar

Stone for this contract was quarried and crushed at Bowden, W. Va., and delivered by rail in hopper-bottom cars. It was unloaded into a pit beneath the siding track and loaded directly into trucks with a Jeffrey unloader. A second Jeffrey unit was on hand in case it was necessary to stockpile the stone at any time. The stone was W. Va. No. 7, varying from ¾-inch maximum down to ¼-inch minimum screen size.

Keeley Construction Co. Made Rapid Progress on 6.4-Mile Secondary Road Project Near Davis, W. Va.

The two tars were supplied by the Barrett Co. from its plant at Johnstown, Pa., and delivered in tank cars from which the contractor loaded his Rosco distributor for application of the material to the road. There were two grades of tar, TC-2 with a viscosity of 13 to 18, for priming the base, and TM-2 with a viscosity of 26 to 36 for the road-mix. The former was heated to 110 to 115 degrees Fahrenheit before application and the latter to 150 degrees.

Stone Spread on Primed Base

The priming of the base was done in two applications of 0.2 gallon per square yard each, about 3 days apart or longer if the base had not thoroughly seasoned after the first application of the TC-2 tar. After the second application of the prime tar had seasoned, the No. 7 stone was spread from the tail gates of the trucks at the rate of 100 pounds of stone per square yard. This was handled so accurately that when the job was half done the superintendent had used 27 of his 55 cars of stone.

The device that insured this accuracy was extremely simple but effective. It consisted of a cord 70 feet long with a stake at either end and another marker 10 feet from one end. The larger trucks started dumping their loads at the stake and continued through to the end of the 70-foot cord, returning if the load was not completely dumped on the one trip. The smaller trucks started dumping at the 60-foot mark. Thus in every 60 or 70-foot stretch of the road the contractor was assured of the proper amount of stone for the retread.

This stone was mixed dry by pulling

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Center Striping Machine to Meet Local Conditions Built by Nevada State Highway Department

RECOGNIZING the importance of highway center striping as a safety measure for its traveling public, the Nevada State Highway Department has made several attempts to purchase more adequate equipment than they had been using for this purpose.

It was found the small commercial push-type machines were suitable for striping in cities where conditions were more or less ideal, or for striping short distances only. Most of them proved to be somewhat inadequate for highway striping, so it was decided to experiment and build a more practical machine that would, in most instances, cope with the many obstacles that had been encountered in highway striping.

What Was Needed

Before actual experimenting began, a definite plan was laid out. From past experience it was determined the machine would have to be as narrow as was reasonably possible to build. It would also have to be a complete trouble-proof self-contained self-propelled unit, capable of traveling from one location to another under its own power at relatively high cruising speeds. The edges of the stripe it would paint would have to be well defined and the machine should be capable of painting 20 miles or more of stripe in eight hours.

To understand the reasons for all of these requirements, one must remember that Nevada is the most sparsely settled state in the Union, and its towns, where supplies could be purchased or repairs made on special equipment of this kind, are usually many miles apart. For this reason the machine had to be as nearly trouble-proof as possible but, in the event of breakage to its spray mechanism, capable of traveling under its own power to the nearest town for repairs.

Often a few miles of road, 50 miles or so from the base where the machine would be stationed permanently, are reconditioned and require re-striping. This is another reason why the machine had to be self-propelled and a complete unit within itself, so it could leave its base of operations in the morning, do the re-striping, and return to its base the same day.

Still another reason for the complete unit is that, due to climatic conditions,

(Continued on page 11)

The Seagull, Nevada's Center Striping Machine, Just Starting to Paint

Widening and Deepening The New York Barge Canal

Two Contractors in Adjacent Sections at Utica Use Large Draglines with Varied Handling Due to Design

(Photos on page 52)

THE original New York State Barge Canal was started in 1903 and connects the Hudson River with Lake Ontario at Oswego and Lake Erie at Buffalo. Shipping was slow to use the new traffic artery but gradually, and particularly in 1935 and 1936, barge tows and self-propelled barge traffic increased in volume and bulk so that over $4,000,000 in contracts were awarded for deepening the canal from 12 to 14 feet and widening it from 75 feet to 104 feet for the bottom with an additional 15 feet of width on curves, carried 1,000 feet along the tangents in both directions.

The excavation, which was done by contract, was in hard packed sand and gravel with some clay, silt and muck which had been brought in by creeks. Contract No. 4 was awarded to Morrison-Knudsen Co., Inc., of Boise, Idaho, for the excavation of 900,000 cubic yards at 46 cents per cubic yard for a total of $414,000. Contract No. 8 was awarded to W. E. Callahan Construction Co., of Dallas, Texas, for the removal of 1,000,000 cubic yards at 54 cents per cubic yard or a total of $540,000.

Contract No. 4

Morrison-Knudsen used its Bucyrus-Monighan 5W first to widen the top of the levee sections from the land side so that the machine could run safely. Then it swung and handled excavation in the canal channel and from the opposite bank. This was effected by swinging the bucket toward the opposite bank and then pulling it the balance of the distance with a Caterpillar Fifty diesel tractor with a rear-mounted winch and steel cable.

The Monighan had a 100-foot boom and swung a 5-yard Esco dragline bucket. The machine is powered with a Fairbanks-Morse 5-cylinder 250-horsepower diesel engine with a belt-driven Gardner-Denver compressor for the operation of the brakes and a Goulds Hydroil pump. The swing motor is a G-E 40-horsepower motor driven by a 36-kw G-E generator belted to the main engine. An independent G-E lighting plant illuminated the inside of the machine as well as furnished current to the floodlights for night operation on the three 8-hour shifts.

A Bucyrus-Erie 50-B with a 70-foot boom and a 2½-yard P & H aluminum bucket which handled the loose material with remarkable rapidity supplemented the Monighan on the far bank. In order to permit the contractor's trucks and the operators' cars to run on the top of the levee, a heavy rail drag was pulled over the top of the embankment regularly to smooth it off.

The Monighan on this contract had a maximum yardage of 92,000 cubic yards in October, 1935, and a yardage of 75,000 cubic yards in July, 1936, with comparable yardages for the intervening months.

Contract No. 8

On Contract No. 8, W. E. Callahan used a Bucyrus-Monighan 6W with a 150-foot boom swinging a 6.6-yard Page dragline bucket. The Monighan worked first along the canal edge, swinging its material a full 100 feet back from the top of the slope. Then it moved back against the spoil bank and cut out the 1 on 2 slope, or, where the material was very soft, a 1 on 4 slope. In all cases a 50-foot berm was left between the top of the canal bank and the toe of the spoil bank which was left not more than 6 feet above, the berm being trimmed off with a Caterpillar RD7 diesel and LeTourneau Angledozer. Because of the amount of muck in this section which ran back from the spoil bank and softened the berm, 10 x 20-foot mats with two heavy rings for quick moving were placed ahead of every move of the Monighan.

The Callahan Monighan was powered with a 4-cylinder 240-horsepower Fairbanks Morse diesel engine which also had a belt drive to the generator for operating the 60-horsepower G-E shunt-wound motor which drove the swing motor. A Gardner-Denver air compressor, also driven by a belt, furnished air for the operation of the brakes. An independent Kohler 1,500-watt light plant furnished light for night work as this Monighan was run three 8-hour shifts, at a cost of only 60 cents per hour for fuel for the main engine. A Northwest crane with a 55-foot boom and a 1-yard Owen clamshell was used along this section for clean up.

In June, 1936, the Monighan moved 116,000 cubic yards on this section and

(Continued on page 31)

SHOVEL RIPS PAVEMENT

Old Concrete Pavement and Sidewalks, 32 Feet in Width, Being Ripped Up at the Rate of 50 to 60 Feet an Hour by a Lorain Shovel Powered with a Caterpillar 125-Hp Diesel Engine, and Loaded Into a Mack Truck in Chicago

The Testing Laboratory of the Wayne County Road Commission

Laboratory Control Of Highway Work

By LEROY C. SMITH,
Engineer-Manager, Board of Wayne County Road Commissioners

Wayne County, Mich. Has Complete Facilities For Checking Materials and Field Results

IT IS a known fact throughout the civilized world that the whole is equal to the sum of all its parts and in order to produce an excellent product, the materials going into such a product must also be of an excellent quality.

The Board of County Road Commissioners, whose members at present are Michael J. O'Brien, Chairman, Edward N. Hines, Vice-Chairman, and Peter M. Schoenherr, Commissioner, in its thirtieth year of operation, has always endeavored to give the people of Wayne County, as well as visitors, the best roads and bridges possible with the money available for this purpose, and also to maintain such roads in the best travelling condition.

Since the adoption of the county road system, Wayne County has been a leader in highway matters. Its activities have been studied and emulated all over the world. The first mile of concrete highway in the world was built in Wayne County in 1909, and that one mile is the parent road to the thousands of miles of concrete rural highways in the United States as well as the thousands of miles of city and village streets, alleys and highways in all parts of the world.

In order to reach that end, we must turn to the beginning, that is, the design of the road and the control of the materials that go into it. It is of extreme importance that the design of the wearing surface and the control and strength of materials be given very serious consideration, as we could not hope to obtain the desired results without such control.

Specifications

It is of primary importance that specifications should conform with the accepted practices. Good practice changes from time to time, and it is necessary that specifications should change along with it. Our specifications for highway construction and maintenance and for the materials used therein are always up to date and conform to all accepted methods and practices. They are not encumbered with unnecessary requirements, but sufficient demands are contained in them to insure materials which are suitable for the purpose specified and also for uniformity in quality and strength.

Laboratory Part of Organization

Previous to the establishment of our own laboratory, we had to rely upon outside commercial agencies for testing materials, and by the time the results were available, there had been a considerable delay in construction operations. These tests were costly, we did not have a direct control at any time, and when tests were performed on completed work, we had to accept the results, good or bad, with the feeling that if we had had some control, we could have effected a remedy during the course of operations.

Our laboratory was established in 1927, its main function being to assure that all materials used in the construction of roads and bridges and in their

(Continued on page 25)

C. & E. M. Photo

Bronzed Maintenance Men Peeling Extruded Expansion Joint Material

Arizona Maintains Expansion Joints

Unlike Other States, Arizona Looks after Condition of the Joint and Cuts It

WHEN an expansion joint in a concrete highway starts to bleed, many states say that it is bound to do that, and leave it. Others say that they want it to bleed, because the material, poured joint or premoulded, will mushroom over the slab and protect the edges from spalling. "Bunk," says Arizona, and she cuts the mushroomed material off the slab and leaves a smooth pavement for the automobilist to ride over.

When the weather has not reached the high nineties and the material is still quite hard to cut, it is taken off with a mattock or a steel shovel with two men behind it. When really hot weather sets in, one man can peel it off easily. The material is not saved to salvage the asphalt at a central plant, nor is the portion of the pavement where the joint material has been removed covered with sand as there is plenty of dust that quickly comes in from the shoulder and prevents any chance of the material picking up on cars.

In order to protect the maintenance crews that do this work, tripod stands with a pair of red warning flags at 90 degrees warn approaching traffic that there is danger ahead and to drive carefully. The crews in the Third District use an International truck which carries the tools and materials and tows a special heating kettle on which is mounted a small Curtis air compressor for the operation of the gasoline torch for burning or for heating the kettle.

The Arizona State Highway Department has four shops where equipment is maintained and repaired and such new devices as are needed are added to the existing machines or mounted on them. There is also one small shop for minor repairs in Douglas on the Mexico border. T. S. O'Connell is State Highway Engineer of Arizona.

THROUGHOUT MOST OF THE COUNTRY THE SAME SCENE WAS BEING ENACTED

As this paving gang laid Atlantic City's newest TEXACO Sheet Asphalt pavement last year, three other gangs were constructing TEXACO streets on the Texas Centennial Grounds in Dallas,—at the foot of Pike's Peak in Colorado Springs, Colo.,—and in the city of Chicago.

Between these four widely scattered points—simultaneously—thousands of miles of other streets and highways were being surfaced with TEXACO Asphalt.

Last year and for a quarter-century prior to that, choice of TEXACO Asphalt for street and highway projects extended from the Atlantic Coast all the way across to the Rockies, from the Great Lakes to Mexico.

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Man's Works vs. Nature's Floods

The succession of disasters for the past few weeks from Pittsburgh south to Cairo has startled every citizen. Particularly have they caused increased thought on the part of those who build —the engineers and contractors of this country.

Army engineers have designed the present flood control system with its fuse plugs and spillways to protect property from the ruin carried by muddy waters and humans from the discomfort and pestilence borne by the crest of the flood. Army engineers used the disastrous 1927 flood as the basis for levee locations and elevations, yet today we witness a greater flood, a "super-flood" that again tops levees and floods cities.

Might it not be well to consider the great St. Francis, Yazoo and Tensas Basins as economic entities rather than fighting fronts? Much of the land, though fertile, is or has been flooded regularly and has gained rather than lost in fertility through inundation. Why not make these great areas Federal lands and lease them back to the present owners for cultivation with the understanding that the land will be deliberately flooded annually, or less frequently, by Federal engineers and that all domiciles will be constructed above the flood elevation and provisions made for easy evacuation under Federal guidance whenever necessary?

These great areas are necessary as storage reservoirs to take up the surge of flood waters and thereby protect the greater concentrations of people and industry in the cities along the shores of the Mississippi.

Increased protection of cities might also be possible by encircling them with great walls, not merely levees, built the maximum projected elevations for the erection of flash-boards such as are used to increase temporarily the spillway heights of many dams.

We do not concur with the scheme of the eminent engineer who would excavate two channels paralleling the Mississippi River, one to the east and one to the west, to carry off the flood waters, nor with "General" Coxey's scheme to straighten the Mississippi channel to hasten the flow of waters from Cairo to the Gulf. We would also discard the idea of stemming the floods by great evaporating plants as was seriously suggested nearly two decades ago by an earnest Mississippi Valley woman of some prominence in conference with a U. S. Army District Engineer. Rather, we would suggest an approach from the economic standpoint with deliberate flooding of "marginal lands" and greater protection for the cities of the great central valley of these United States.

States Report Conditions Of Rural Primary Roads

There were 331,867 miles of rural primary state roads at the end of 1935, of which 279,807 miles had some form of surfacing, according to reports by state authorities to the U. S. Bureau of Public Roads. During 1935, 14,441 miles of state roads were resurfaced, generally with higher types, and new surfacing was placed on 6,262 miles, making a total of 20,703 miles of road surfaced.

The surfacing consisted of 17,562 miles of low types and 3,141 miles of high types. The low-type surfaces were as follows: top soil and sand clay, 3,190 miles; gravel, chert and shale, 10,331 miles; waterbound macadam, 530 miles; and low-cost bituminous mix, 3,511 miles. The high-type surfaces consisted of 445 miles of bituminous macadam, 677 miles of bituminous concrete, 1,967 miles of portland cement concrete, 47 miles of brick, and 5 miles of miscellaneous surfacing on bridges.

State highway departments now administer 173,603 miles of secondary roads in fourteen states. State systems now include 14,881 miles of urban extensions.

More than 50,000 miles of rural roads on state systems and more than 500 miles of urban extensions on designated state systems remain unsurfaced. A considerable portion of the surfaced roads are in need of surfacing to greater widths and with higher types of surface because of the large increases in highway traffic.

The mileage and condition of improvement of rural primary state roads are reported in the accompanying table:

State	Mileage of Rural Primary State Roads	Mileage with Low-Type Surfacing	Mileage with High-Type Surfacing	Mileage Unsurfaced
Alabama	6,256	2,852	1,203	2,201
Arizona	3,038	2,224	221	593
Arkansas	8,938	5,911	1,687	1,340
California	12,616	5,784	5,702	1,130
Colorado	3,589	2,495	456	638
Connecticut	2,446	1,211	1,146	89
Delaware	1,459	405	1,254	—
Florida	11,689	6,012	1,177	4,500
Georgia	9,146	2,972	2,335	3,839
Idaho	4,753	3,185	192	1,376
Illinois	10,204	17	10,016	171
Indiana	9,304	3,924	4,588	792
Iowa	8,278	3,620	4,375	283
Kansas	9,095	5,115	1,468	2,512
Kentucky	8,238	5,763	1,486	789
Louisiana	4,446	2,243	2,099	104
Maine	2,435	1,709	642	84
Maryland	3,871	1,793	2,078	—
Massachusetts	1,706	150	1,556	—
Michigan	8,431	4,203	3,529	699
Minnesota	10,926	7,882	2,539	505
Mississippi	3,940	2,999	715	226
Missouri	8,156	4,105	3,860	191
Montana	5,131	3,991	87	1,053
Nebraska	10,547	6,074	674	3,899
Nevada	2,488	2,273	50	365
New Hampshire	1,464	1,023	441	—
New Jersey	1,409	41	1,307	61
New Mexico	10,095	3,478	116	6,501
New York	13,911	2,152	10,364	1,395
North Carolina	10,779	6,118	3,908	773
North Dakota	7,338	6,178	42	1,118
Ohio	12,203	5,410	6,724	69
Oklahoma	7,649	3,861	2,631	1,158
Oregon	4,610	2,674	1,596	340
Pennsylvania	12,974	5,309	6,775	890
Rhode Island	1,019	196	483	340
South Carolina	5,996	3,237	2,375	384
South Dakota	5,959	4,873	228	858
Tennessee	7,181	4,016	2,669	496
Texas	20,461	8,970	6,007	5,484
Utah	4,694	2,409	308	1,977
Vermont	1,765	1,313	429	23
Virginia	9,122	6,319	1,559	1,244
Washington	3,542	2,104	1,227	211
West Virginia	4,670	1,834	2,253	583
Wisconsin	9,982	5,022	4,523	437
Wyoming	3,537	3,033	35	469
Total	331,867	168,282	111,535	52,050

for Autos and Pedestrians Future Roads To Be Safer

The main highways of the future will be broad, unobstructed surfaces over which traffic can flow smoothly with safety and comfort, according to Thomas H. MacDonald, Chief of the U. S. Bureau of Public Roads. In discussing the work that State and Federal governments are doing to make the main highways safe under modern traffic conditions he stated:

"There will be provided, for motor vehicle operators of the future, roadways that can be used with safety by the reasonably careful driver.

"The roads of the future will have traffic lanes wide enough for ample clearance. That means that at the speeds we now foresee we will want a 22-foot road for two-lane traffic. It will have shoulders wide enough for stopping; no deep side ditches. Its surface will be consistently smooth, and non-skid. It will be so designed as to alignment, profile, and cross section, that at no place will the traveler suddenly encounter the unexpected or come into traffic so slow that if impatient he will be tempted to take a chance.

"Where the traffic is so heavy that two lanes will not carry it, there will be four-lane roads. But they will consist of two lanes on each side of a center parkway—there will be no chance to meet opposing traffic as there is in the present road with four contiguous lanes. Most engineers endorse the principle of separated-lane roads wherever more than two lanes must be provided to carry the traffic.

"More highways will be lighted, no doubt, but the amount of lighting will depend on the funds made available for highways and whether we find that we can spend the money in other ways that will be more effective in preventing accidents. Greater dividends in lives saved per thousand dollars of expenditure would result from construction of footpaths along heavily traveled routes and from separation of grades of intersections of main traffic arteries than from a general lighting program.

"However, lighting will have a place in the future program. Old methods of lighting are inefficient and of doubtful value, but marked improvements are being made. We must experiment to produce a thoroughly efficient system of lighting. We must also light experimental sections of highway and accumulate accident records as a guide in determining where the expense of lighting is justified. I think it is clear that lighting for all roads is not possible now. Installation is not expensive, but operation would cost more than all other items of highway maintenance put together. And, as it is, most highway departments do not have enough maintenance money to keep the highways in as good shape as they would like.

"We will have pedestrian walkways at a safe distance from the highway surface; also, on heavily traveled roads we will have surfaced areas where buses may pull out of the stream of traffic to receive and discharge passengers; and turnouts for the R.F.D. carriers to use in serving the boxes of their patrons. The danger spots which cannot be eliminated by reason of great expense will be plainly indicated by signs that will advise the motorist what speed *is* safe.

"The highway engineer's part in promoting highway safety is to design highways that are safe for reasonably careful drivers, that is, highways as safe as can be built with the funds available. They will be highways on which you can pass an overtaken vehicle with safety, highways that will not confront a driver with hazardous conditions without ample notice or warning. When this has been accomplished, the highway will occupy its proper place in supporting the safety triangle of the road, the vehicle, and the driver. But finally, safety will always rest with the driver."

Courtesy, Rockefeller Center Weekly
"This Is My Son—I'm Breaking Him In"

Bureau of Reclamation Construction to Date

Contracts valued at $141,856,760 for construction and purchase of materials on Federal irrigation projects have been let since the emergency program of the U. S. Bureau of Reclamation was launched three years ago, according to a recent issue of *The Reclamation Era.*

Major items in the program are thirty-five dams for the conservation of water in the West, of which four have been completed and put in service, twenty are under construction and contracts for the construction of three more will soon be ready for award. Eight additional dams are in various stages of preliminary design.

Construction contracts now in force total $85,974,677 in value while $55,882,083 has gone for the purchase of materials, equipment and supplies, and to finance work by government forces.

A total of 12,000 men are employed by contractors on construction now in progress and 4,000 are employed in work being done by government forces, making a total of 16,000 men directly employed.

The four dams about to go into construction are the 110-foot earth-fill Boca Dam on the Little Truckee River in California, which will store water for the Truckee Meadows area of Nevada; the Marshall Ford Dam, a 265-foot concrete straight-gravity flood-control dam on the Colorado River, near Austin, Texas; the 80-foot earth-fill Fresno Dam of the Chain of Lakes storage project in Montana; and the earth-fill Pine River Dam to be constructed near Durango, Colo.

The contract for the construction of Boca Dam was recently awarded to the George W. Condon Co. of Omaha, Nebr., at its bid of $729,435. Bids have already been received for the Marshall Ford and Fresno Dams and the Pine River Dam is being advertised this month.

The eight dams now being designed include a few large storage dams such as those of the Central Valley project in California and some small diversion dams.

Flu Beats Taxes

The wide incidence of influenza which has swept the eastern part of the United States these past eight weeks placed the two authors of our series of tax articles on the inactive list. William H. Crow, Tax Attorney, who prepared the first three articles, and Urban S. Greene, Certified Public Accountant, co-author of "Planning for Tax Economy," who was to have collaborated in the final article of the series on accounting for tax economy, have both been ill. The article scheduled for publication in February will appear in the March issue of CONTRACTORS & ENGINEERS MONTHLY *instead.*

Caissons and Concrete For Missouri R. Bridge

K. C. Bridge Co. Pushes Work on New Route 40. Structure to Be Opened Later This Year

THE State Highway Department of Missouri is providing a new river crossing for U.S. Route 40 about 15 miles upstream from the existing free bridge at St. Charles where Route 40 crosses the river at present. The new bridge consists of an open abutment at each end and seven piers. At the north end are two approach spans 145 feet long followed by two 512-foot spans continuous over Pier 4, another pair of the same length continuous over Pier 6, and two 130-foot approach spans at the south end.

Sand Island and Caisson at Pier 5

The driving of sheet piles for the sand island for Pier 5 began on June 18, 1936, with a McKiernan-Terry No. 9 steam hammer driving the 55-foot piles about 37 feet into the river bed. The island was 32 feet in diameter for the sinking of the caissons in the 15 feet of water at the summer stage. The driving of the piles was completed June 24 and filling with sand began at once. This was clammed from the river and was completed on the following day.

On June 16 the cutting edge of the caisson was brought in and spotted. The cutting edge was a plate 24 x ¾-inch stiffened at the bottom with 8 x 8 x ¾-inch angles running continuous around the inside and with triangular stiffener plates in the angles every 2 feet. The caisson shell had an outside dimension of 22 feet and the inside diameter was 10 feet. The forms for the working chamber of the caisson were set with 9-inch steps to a maximum height of 9 feet, the working chamber packed with sand on June 26 and the first lift poured on June 29.

There are two caissons for each pier, connected only for the top 15 feet. The method is interesting and effective. The 15-foot steel forms for the caisson had a groove bolted at each side to receive a section of steel sheet piling so that when the two cylinders for one pier were sunk to the proper depth, leaving 3 feet of water over the top of the cylinder, the two caissons could be connected by two lines of steel sheet piling. This section was poured with a tremie seal 3½ to 4 feet thick after the mud and trash were washed out. On top of this the ice breaker section is poured.

Each lift poured on the caissons was 11 feet 8 inches and this was done within the removable steel forms which were made in two sections for ease of handling. As mentioned above, this section was left on when the last pour was made and concreted into the top seal and the ice breaker section. The caissons were poured and sunk in free air as long as feasible and then, when capping for compressed air work was necessary, a 15-foot section was poured, followed immediately by an 11-foot 8-inch section. The caissons were carried to 72 feet below low water level. Between each two lifts of the caisson 20 or 22-gage metal was inserted to act as a seal against air leakage. The metal was usually scraps found on the job, a minimum of 6 inches wide.

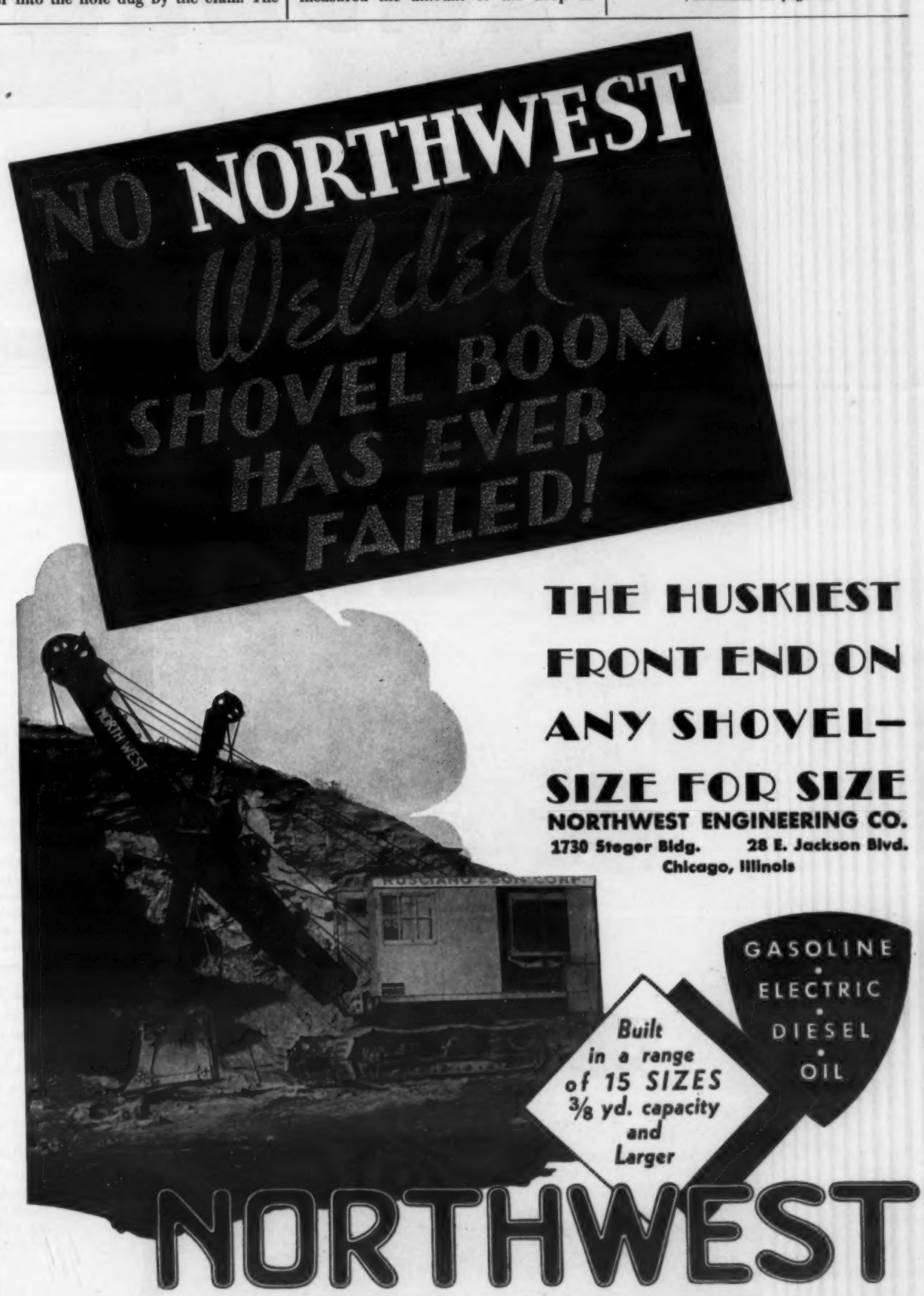
The excavation in free air was done with an Owen 1-yard clamshell bucket handled by a Lidgerwood 3-drum steam hoist on a barge. The caissons were sunk with remarkable freedom from difficulties except that the upstream caisson on Pier 5 had a distinct tendency to tip. This was corrected without the use of emergency measures. The scour of the river required the use of temporary jetties to prevent under-cutting of the ring of steel sheet piling containing the sand island. The river bed actually scoured to a depth of 28 feet both upstream and downstream but the temporary jetties rushed into place by the Kansas City Bridge Co. checked the scour and built up the river bed 5 feet in one night during high water.

The procedure for the sinking of the caisson was the usual method of clamming out the center core and then when the judgment of the foreman told him that the caisson was ready to sink another inch or so, the clam was dropped full in the well, washing the sand from the outer sections of the working chamber into the hole dug by the clam. The caisson would then tremble a bit and sink. The quadrant in which the major dredging was done determined the portion that would drop the most in the next sinking. A pair of men constantly measured the amount of the drop of the caisson in the four quadrants to prevent tipping too far in any one direction.

A ladder was cast in one wall of the caisson for the men working under air

(Continued on page 22)

C. & E. M. Photo
The Downstream Sand Island at Pier 5 with the Cutting Edge in Place



Thermal Expansion of Typical American Rocks

Bulletin 128 of the Iowa Engineering Experiment Station, Iowa State College of Agriculture and Mechanic Arts, Ames, Iowa, is devoted to a study of the thermal expansion of typical American rocks by John H. Griffith, Research Engineer. This study deals with the thermal expansion tests of some 100 typical rocks to determine the coefficients, particularly of the type used for building purposes through the moderate ranges of temperature usually encountered in building practice.

This 36-page study is divided into six parts, the first of which covers the classification of rocks, the selection of samples and their preparation. The second portion covers the determination of coefficients of thermal expansion, describing the electric furnace and accessories used while the third portion is devoted to determination of the average coefficients of thermal expansion and calibrations of the equipment used. Part four is devoted to an analysis of the thermal expansion data, Part five to the summary and conclusion and Part six gives the thermal expansion curves. Copies of this Bulletin may be secured without charge from The Director, Iowa Engineering Experiment Station, Ames, Iowa.

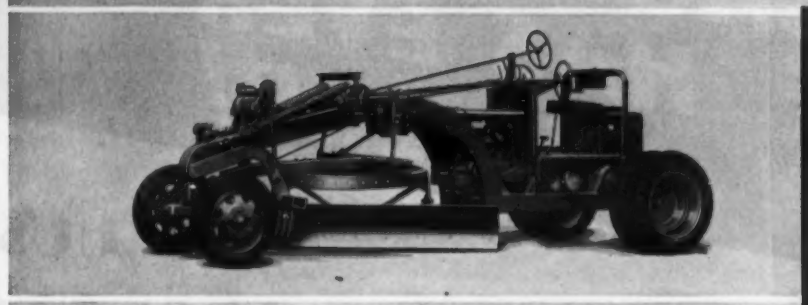
Italian Road Commission Established in Africa

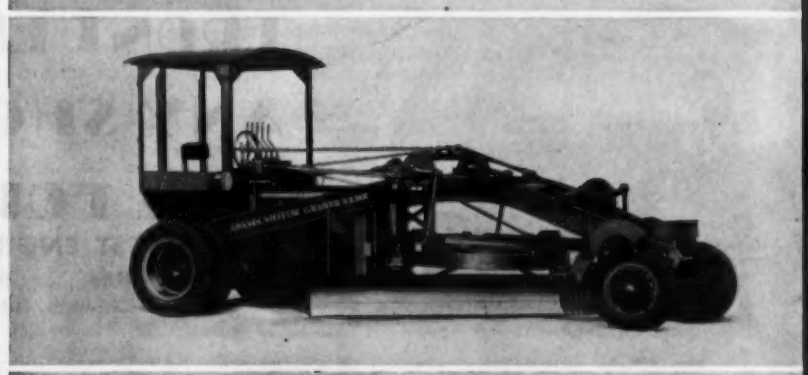
Announcement has been made of the foundation of a branch of the Italian State Road Board for the construction and maintenance of roads in Ethiopia, Libya and Italian Somaliland, according to a report from the U. S. Bureau of Foreign and Domestic Commerce.

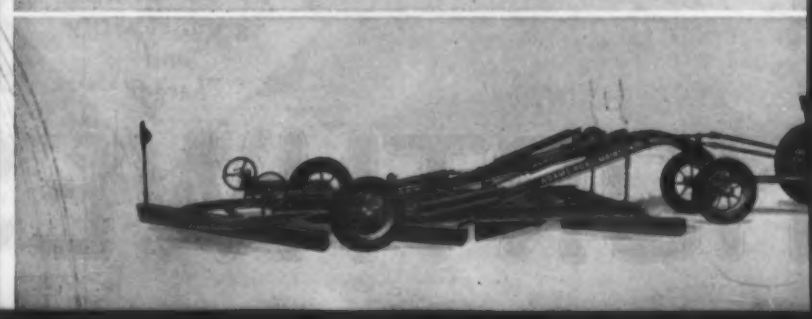
This branch of the Italian State Road Board will have charge, under the direction of the Ministry of Colonies, of the administration, accounting, contracting and technical work of developing the road systems of this territory and will open a main office at Addis Ababa and a number of branches, each with a technical and clerical staff. The main office will be under the direction of the Civil Engineer Corps.

The Ministry of Public Works estimates that approximately 1,739 miles of modern roads will be constructed in Ethiopia during the next two years. These roads will be of two-lane construction, with bituminous surfacing.

ADAMS







ADAMS MOTOR GRADERS

● Shown above is Adams Heavy-Duty Motor Grader No. 51 powered by International 62 H.P. Diesel engine—the most powerful motor grader ever offered. Has ample power and capacity to handle all kinds of heavy work—road-mix, scarifying, surface grading, ditching and snow removal. Has a speed range of 1 to 15 m.p.h. to suit any job . . . Furnished with two-wheel drive or Adams Tandem Drive as illustrated. Scarifier and long front axle with adjustable leaning wheels optional equipment . . . Same machine offered with 59 H.P. gasoline engine—known as No. 50.

At upper left is Adams Motor Grader No. 20—a new, low-priced machine powered by International I-12 tractor with 22½ H.P. engine. Special rear drive enables this machine to do a surprising amount of work. Ideal for maintaining township roads, unimproved streets and alleys, etc. Has 9 ft. blade—scarifier and canopy top are optional equipment.

At left is Adams Motor Grader No. 301 powered by International I-30 tractor with 39 H.P. engine—a popular machine for general maintenance work. Available with two-wheel or tandem drive . . . Same type machine offered with Case 57 H.P. engine—known as No. 151.

ADAMS RETREAD PAVER

● The outstanding, moderately priced machine for "road-mix" jobs. Thoroughly mixes tar, asphalt, or road oils with stone, gravel or other aggregates and spreads the mixture to specifications ready for rolling. Mixes quicker and finishes much better than is possible with graders. Also ideal for mixing and spreading on stabilization work.

ADAMS MULTIPLE-BLADE MAINTAINER

● Has 40 feet of blades which work the road surface four times in one trip. Unequalled as "chatter-bump" remover on gravel and stone roads. Produces a planing action not possible with graders . . . Used also for mixing and finishing on light retread work.

Dark Westchester Roads Riskier Than Lighted Ones

The darkened Westchester County, N. Y., roads, where the lights were turned off for economy during the depression, have been found to be far riskier than the lighted Long Island parkways, according to a mathematical comparison study made by the *Automobile Club of New York Review*. This study indicated that there was four times as much chance of motorists being injured and twice as much chance of their being killed while driving over the unlighted Westchester roads as when driving on the Northern or Southern State Parkways on Long Island which are properly illuminated.

During 1935, five people were killed and 155 were injured on 39.2 miles of Westchester parkways, while only two were killed and thirty-five injured on the Long Island Parkways which together cover 28.4 miles, every mile of which is lighted.

In a new survey covering the first six months of 1936, it was found that 44 accidents occurred on the Northern and Southern State Parkways on Long Island, 15, or 34 per cent, of which took place between 6 p.m. and 6 a.m., which are generally conceded to be the hours of darkness, while 367 accidents occurred on the Westchester Parkways, which are still unlighted, 183 of which, or 44 per cent, took place during the hours of darkness. In other words, the percentage of motor mishaps was 16 per cent greater from dusk till dawn on the Westchester roads than on the two most important and heavily-traveled Long Island Parkways.

The *Review* makes still another appeal to the Board of Supervisors of Westchester County against this archaic and dangerous manner of cutting the budget.

WPA Funds for Bridges Destroyed in Vt. and Pa.

Some nine months after the floods of the spring of 1936, Vermont and Pennsylvania had funds allocated by the President from the monies of the Emergency Relief Appropriation Act of 1936 to replace the bridges damaged and destroyed by those floods. The funds allocated on December 29, 1936, were $4,678 for Vermont and $121,095 for Pennsylvania. The projects will be carried on under the supervision of the U. S. Bureau of Public Roads.

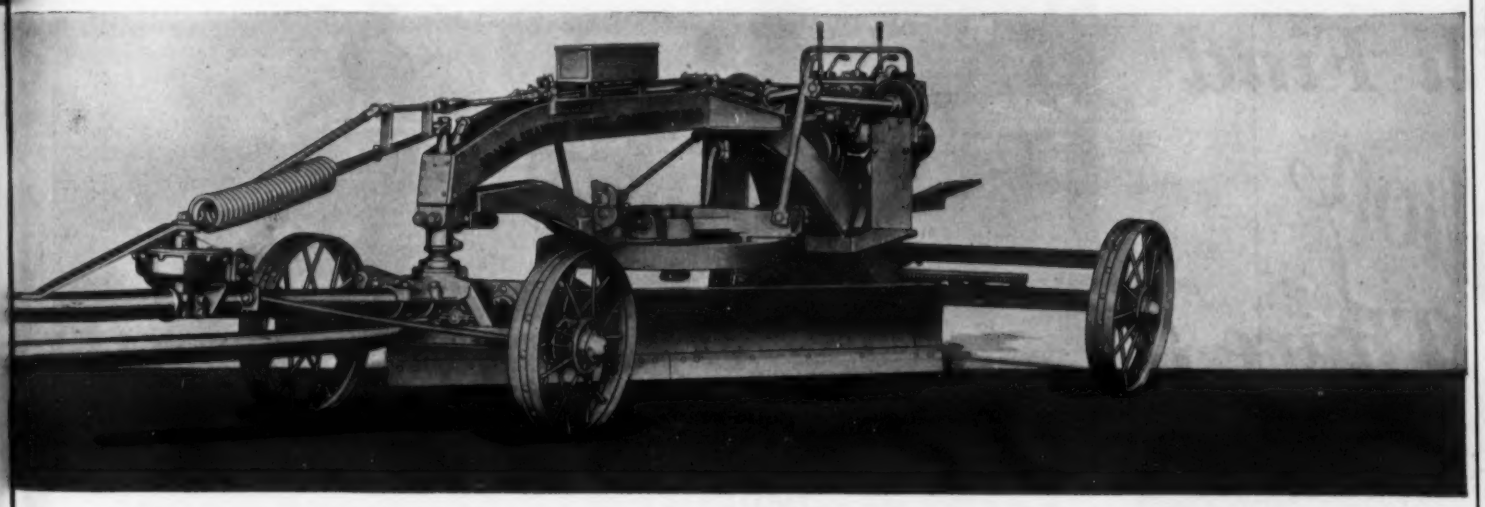
LEADS AGAIN in 1937

AGAIN in 1937 Adams offers the most distinctive and outstanding machinery of its kind ever offered the road building industry. Everywhere the present line of Adams leaning wheel graders is considered "tops" among all those familiar with them . . . On all sides Adams new heavy-duty motor graders are acclaimed the most powerful, most versatile and most economical motor graders on the roads . . . Adams elevating graders continue to be the favorites of users everywhere . . . And, this year Adams offers a new, low-priced motor grader which will interest those with limited work or limited funds.

Don't buy any road grading or maintenance machinery until you inspect the Adams line. Ask your local Adams representative or dealer for particulars or write direct to ROAD ADAMS MACHINERY

J. D. ADAMS COMPANY • INDIANAPOLIS, IND.

Branches, Representatives, and Distributors throughout the U.S.A.



ADAMS LEANING WHEEL GRADERS: Offer a new, wide range of blade positions which permits cuts not possible with other machines. Have extraordinary strength, rigidity and visibility. Don't buy any road grader until you see one demonstrated. Available in 8, 10, and 12 ft. sizes—hand or power-operated.

ADAMS ELEVATING GRADERS: Have several exclusive and patented features of fundamental design which make them unequalled for capacity and stability. Furnished with 19, 22 or 25 ft. carriers and 42 in. or 48 in. belts. Power unit for operating carrier and controls available in gasoline or Diesel type.

A Portable Asphalt and Pre-Mix Plant

The Standard portable paving plant for asphalt or pre-mix, made by the Standard Steel Works, 5001 Boyle Ave., Los Angeles, Calif., is a large-capacity plant of comparatively small size, adaptable to large or small jobs, and easily portable on its own wheels or on trucks, trailers or flat cars. As each unit is individually self-contained on its own wheels, they are easily grouped by combining the units, making a complete plant ready for work.

The plant consists of four or more feed bins, a rock and sand dryer, a hot elevator, a Symons vibrating screen, a hot storage bin, a dust bin, a quick-discharge weigh box, a Weighmaster which is a fully automatic electric controlling device for charging the weigh box accurately, an asphalt bucket and a twin-shaft pug-type mixer.

The sand bin is arranged with a reciprocating plate feeder and the three rock bins are provided with adjustable gates to arrange a uniform flow of material onto the belt. The dryer is an oil-fired Standard two-tire revolving type, running at a peripheral speed of 135 to 145 feet a minute. The screen is the vibrating type, operated at such speed that at no time more than 5 per cent is carried over from the preceding bin. The plant capacity is limited by the mixing features of the unit, and the screen size is such as to meet the minimum specifications.

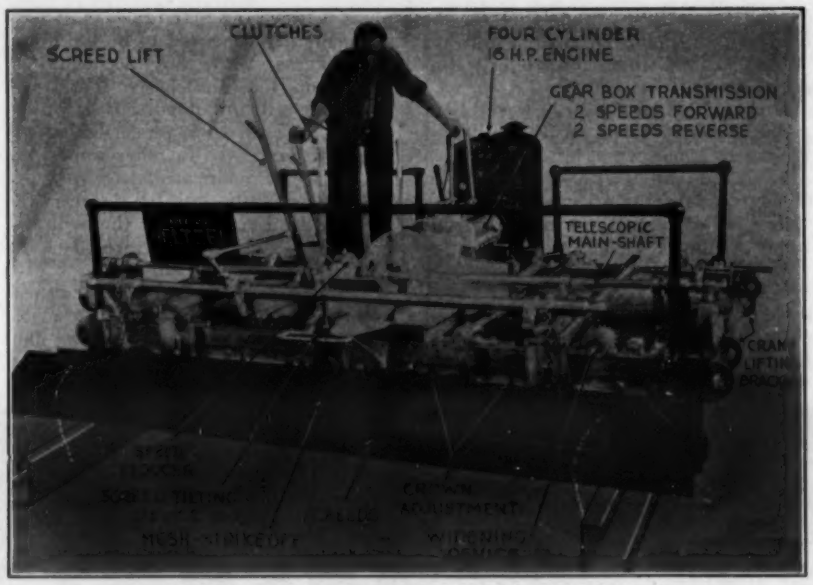
The hot-storage bin has a capacity equal to eight times the rated capacity of the mixer and is divided into four straight-in-line compartments so proportioned that their percentages will approximate the mixture being handled. Each compartment is provided with an overflow pipe, and an individual roller-type gate, designed to cut off quickly without clogging or arching. The dust bin is a separate unit, attached to the aggregate storage bin. The weigh-box has sufficient capacity for a complete batch and hangs free at all times from four-point suspension scales. The axis of the weigh box is set at a right angle to the shafts of the mixer, which blends the charge entering the mixer.

The asphalt bucket is of the steam-jacketed bottom-discharge mushroom type, with a capacity not less than 10 per cent of the rated capacity of the mixer, water level measurement. The three-way discharging valve for the asphalt bucket is electrically controlled for continuous circulation to the supply tank. The full automatic electric devices on the weigh box and asphalt bucket are so arranged that there can be no overweighing, underweighing or substitution. The interlocks are so arranged that it is impossible to drop the aggregate into the mixer until the previous batch has been discharged.

The mixers are made in sizes of not less than 500 pounds or more than 7,000 pounds capacity. These from 500 to 3,000 pounds capacity have an arrangement of 28 paddles, while the larger units have 32 paddles.

The necessary crew usually consists of a fireman, one platform man and an oiler, although the number of men varies with the conditions of the job.

Standard portable paving plants, which are sold fully-automatic, semi-automatic or manually controlled in a variety of sizes to meet the requirements of the job, are fully described and illustrated in literature which interested contractors, state and county highway engineers may secure free direct from the manufacturer.



The New Type R Flex-Plane Finishing Machine

New Finishing Machine

A new Panama-Type Flex-Plane finishing machine has just been announced by the Flexible Road Joint Machine Co., Warren, Ohio. This machine is available in two sizes, one which is adjustable from 18 to 30 feet for full width road construction, and the other, adjustable from 9 to 16 feet, for half-width construction.

This machine screeds backward as well as forward and is equipped with built-in gear box transmission, two speeds forward and two reverse, a 16-hp 4-cylinder engine, belting attachment, reinforcing mesh strike-off attachment, and quick adjusting crown attachment on the screed.

Bulletin R-9, describing this Type R finishing machine, may be secured by interested contractors and engineers direct from the manufacturer.

Fleming Made P.C.A. Regional Manager

The appointment of E. M. Fleming as Regional Manager of its Eastern offices with headquarters in New York and the naming of H. J. McDargh as Southeastern Regional Manager has been announced by the Portland Cement Association. Mr. Fleming has been District Manager at New York since March, 1935. Mr. McDargh, who will make his headquarters in Atlanta, Ga., has been District Manager at Indianapolis since 1934. These men joined the staff of the Association in 1926 and 1924 respectively.

You'll Find Galion There!

Galion No. 110 Leaning Wheel Grader with Manual Control

Where tough road building jobs are under way . . . where dependability is essential . . . where stamina and long life are helping to lower highway costs . . . *there* you will find a Galion road building and maintenance unit on the job.

That is where Galion won its reputation . . . that is why many Contractors and Road Builders all over the country are users of these dependable units. From the very start of ground-breaking . . . through the last steps in surfacing and rolling . . . Galion Units are making roadbuilding history. In maintenance work, you have only to see them in action on almost any highway . . . then look at County and State cost sheets.

Galion "Junior Patrol" Motor Patrol Grader (right) for general maintenance service. (Below) a Galion Motor Patrol Grader with McCormick-Deering I-30 Tractor unit, double drive, wide front axle and hydraulic control.

Back of all this lies a definite reason. For thirty years now, Galion has specialized in the design and manufacture of Road Building and Maintenance Equipment . . . many Galion features cannot be obtained elsewhere. Practical men, skilled men, every one . . . work constantly to fill tomorrow's needs . . . think always in terms of better highways and of lowering costs.

Thus, Galion Equipment can save you money . . . each unit is built for a specific duty . . . properly balanced . . . carefully engineered to last a lifetime. Yet, you pay no more for the best.

Why not take advantage of the savings you can make by using Galion Equipment? There's a bulletin for each piece of equipment in the broad Galion line. May we send you one . . . or all?

Galion No. 10 Leaning Wheel Grader with Hydraulic Control

• • •

Select the right machine to do your job economically: road rollers, tandem rollers, portable rollers, leaning wheel graders, straight wheel graders, maintainers, planers, motor patrol graders with a choice of five outstanding industrial power units including Diesel engine, drags, rooters, scrapers, spreaders and sanders.

The GALION IRON WORKS and MFG. CO.

Galion : : Ohio

NATIONAL DISTRIBUTION

New Concrete on U.S. 40 in East St. Louis, Ill.

Pavement Breaker, Crusher, Precede Fast Grading and Paving Outfit on 2.57-Mile Job of Blackwell Corp.

(Photos on page 52)

A CONTRACT that was exceptional for the number of new devices used was operated just east of East St. Louis, Ill., last summer by the Blackwell Corp. of that city. It consisted of paving 2.57 miles of highway with 40-foot concrete pavement with 10-foot shoulders. The new pavement generally follows the line of the old pavement, requiring the breaking up of the old slab and its use, crushed, for base material. There was a large amount of borrow amounting to 49,814 yards of which 27,049 yards was used for widening the fill across a lake. The old pavement in this section was saved until the very last so that it might be used in hauling borrow.

Heavy Grading Equipment

Although there were no heavy cuts on the contract there was much shallow grading which required the use of heavy grading equipment. The old grade was cut from 18 to 24 inches in various sections, using a Keystone excavator with a skimmer scoop loading to trucks for the more shallow cuts, a Continental 8-yard wagon scraper pulled by a Model LO Allis-Chalmers tractor, and a Midwest-Patterson 9 to 11-yard hydraulic scoop pulled by a Model K Allis-Chalmers tractor. The fills were bladed with an Allis-Chalmers Model K tractor equipped with a Baker bulldozer. Another A-C tractor with a second Baker bulldozer also pulled a double pivoted sheepsfoot roller made by the Wm. Bros Boiler & Mfg. Co.

On the long fills an A-C Model K tractor with a Galion blade spread and trimmed the grade and the 6-inch layers were rolled with a Galion 10-ton 3-wheel gas roller after all lumps were broken down with a 1,500-pound tandem 18-foot solid disc.

Breaking Up the Old Pavement

A pneumatic pavement breaker developed by Roy Blackwell along entirely new lines was used for the complete demolition of the old concrete pavement. It consisted of a 260-foot Ingersoll-Rand compressor and a pair of swinging leads for the pneumatic hammer, all mounted on a turntable. Thus, with one spotting of the 5-ton International truck which carried the outfit, the hammer with its 52-inch stroke could deliver blows which completely broke up the concrete over an area one-half the width of the pavement and fully 4 feet back from the truck. With this machine the contractor was able to break between 800 and 900 feet of 18-foot pavement 7 to 12 inches thick, including the heavy patches of the maintenance forces, per day. The old marginal bars, center dowels and expansion joints were broken loose from the concrete by the blows of the 260-pound hammer.

The breaker was followed by a Keystone excavator with a skimmer scoop which removed the broken concrete and loaded it directly into a Cedar Rapids portable crusher, 30 x 12 inches, mounted on a heavy channel frame and iron wheels and pulled by a Caterpillar Ninety diesel and operated through the power take-off. The crusher was set to give 3-inch aggregate and the crusher-run material was used as a base for the new slab.

Form Setting and Fine Grading

The required 10-inch edge for the new pavement found the contractor with only 9-inch forms. It was necessary to obtain special permission to attach a 1-inch plank to the base of each length of the Blaw-Knox forms to make them fit the case. A Ted Carr Formgrader cut the trench for the forms as soon as the grade string had been laid out ahead. The forms were set by a foreman and five laborers. Where the new center line varied from the old it was necessary to loosen the old shoulder with a Ted Carr scarifier so that it could be worked readily. Where there was an excessive amount of earth between the forms a Caterpillar Twenty and a 5-foot rotary scraper was put in to take it out. Also ahead of the R-B Finegrader a pony grader with a 5-foot blade was used to spread the earth across to approximate crown.

C. & E. M. Photo

Clever Handling of the Paver Bucket Minimizes Puddling

The R-B Finegrader took out most of the remaining excess high grade and delivered it to the outside of the forms. A Fordson tractor with wheels loaded to give it the weight of a 3½-ton roller followed and compacted the ground. Where the Finegrader left a windrow of earth against the forms two men cleaned it away and tossed it to the shoulder.

The first checking of the grade was with a pipe and sharpened-bolt scratch

(Continued on page 26)

Portable

CRUSHING, SCREENING and LOADING PLANTS

● **With the trend in portable crushing operations towards *bigger output* and *finer sizing*, you'll want to know about the improvements and new combinations in portable plants. Just coming off the press is a new, illustrated 24-page bulletin with the whole story. It describes:**

Telsmith Standard Portable Crushing, Screening and Loading Plants — both for coarse crushing and for fine reduction... the crusher in closed circuit with bucket elevator and vibrating screen. Furnished with jaw, gyratory or reduction crusher.

Telsmith Coarse Crushing Outfits — Mounted jaw or gyratory crusher, not in closed circuit; rugged, big-capacity outfit for quarry or gravel pit operations.

Telsmith Tandem Crushing Plants—A super-crushing outfit for quarry use—a tandem combination of a big coarse crushing unit...followed by a large capacity, fine crushing, screening and loading plant, operating in closed circuit.

Telsmith Dual Crushing and Screening Plants — An exceedingly mobile unit combining jaw breaker and roll crusher with more ample screening and conveying capacity.

General Utility Crushing Plants—A "jack-of-all-trades" unit with either jaw or gyratory crusher—also elevator and engine, on truck.

When writing, ask for Bulletin P-34. PC-1-37

SMITH ENGINEERING WORKS, 4014 N. HOLTON ST., MILWAUKEE, WIS.

Associates in Canada: Canadian Ingersoll-Rand Co., Ltd., Montreal, Toronto, Winnipeg, Vancouver.

50 Church Street, New York City | 201 N. Wells Street Chicago, Ill. | 1013 Commercial Trust Bldg. Philadelphia, Pa. | 81 Binney Street Cambridge, Mass. | 412 Westinghouse Bldg. Pittsburgh, Pa. | Abram-Anderson Co. Detroit, Mich.

The New Bucyrus-Erie Bullgrader

New Tractor Equipment Tried in the Field

The Bullgrader and the Bucyrus-Erie bulldozer, the two first units in this company's new tractor equipment line, have been in use in the field for several months and according to the manufacturer, the Bucyrus-Erie Co., South Milwaukee, Wis., these units have already set new dirt-moving performance standards on widely varied jobs such as highway grading, quarry work, building airports, and on large dam projects.

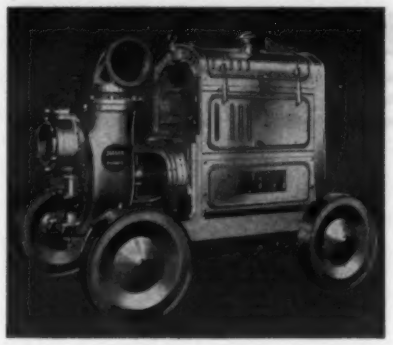
The Bullgrader, as the name implies, is a double-purpose unit which can be used for both grading and bulldozing. The blade may be angled quickly to the right or the left for continuous side-casting, or it may be set straight across for bulldozing. The blade may also be tilted for filling, terracing or establishing a grade. During the winter months, it is an efficient snow removal unit.

The rugged box-welded frame of both the bulldozer and Bullgrader eliminates the need for rubbing plates and transmits the full load from the blade to the tractor track frame at the two points designed to take it. The large twin hydraulic cylinders which power the blade action of both units operate at low oil pressure. A single control, conveniently placed for the operator, enables him to raise, lower, hold or float the blade, commanding a blade travel speed of 32 inches in three seconds. Pressure release ports, exclusive Bucyrus-Erie features on both these units, automatically cut off the hydraulic power when the blade reaches its highest or lowest position.

Both the Bullgrader and the bulldozer are designed to afford maximum visibility for the operator. Another feature of both units is that they may be quickly and easily mounted on a tractor without drilling, cutting or defacing any part of the tractor frame.

Wellpoint Job for Ford Co.

The new addition to the present Ford Motor Co. plant at Somerville, Mass., was awarded to the Frankini Construction Co., contractor, by the architects, Albert Kahn, Inc., of Detroit, Mich. The contractor placed an order with the Griffin Wellpoint Corp., New York City, for two Griffin 8-inch wellpoint pumps, 150 Jet' N Drive wellpoints complete with swings, risers, etc., and 700 feet of header line with valves and fittings. The Griffin Wellpoint Corp. guaranteed to dewater the tunnel section for an area about 300 feet by 40 feet by 20 feet deep. The site is very close to Boston Harbor and the Mystic River. The job was completely pre-drained and is still in progress as dry excavation.



An 8-Inch Jaeger Sure-Prime Centrifugal Pump

Huge Contractors' Pumps At A. R. B. A. Exhibit

A feature of the exhibit of the Jaeger Machine Co., 701 Dublin Ave., Columbus, Ohio, at the A.R.B.A. Road Show was the largest-capacity portable contractors' pump ever built. In this company's standard line of Sure-Prime centrifugals are pumps capable of handling 200,000 gallons an hour. The 8-inch model illustrated is rated at 125,000 gph, with an air handling capacity of 30 cubic feet per minute while pumping water. In spite of these capacities, these pumps are compact and readily portable on their roller bearing trucks.

The basic design of Jaeger Sure-Prime pumps is the same in all sizes from 2 inches up, the pump and engine being mounted integrally, the impeller shaft direct-connected and carried on Timken or ball bearings with a special seal, eliminating shaft packing. All units are full-automatic priming without the use of hand levers or adjustments, even at lifts of 25 feet or above, according to the manufacturer. Once primed, they are designed to hold the prime indefinitely while the pump is idled or shut off. In combination with the open-type impeller used, good-sized stones and trashy water are handled without clogging. The sizes of these pumps are 2, 3, 4, 6, 8 and 10 inch.

ACCURACY for SPREADING SURFACE MATERIALS

The Buckeye Surface Material SPREADER

Cost savings that really pay are gained in both time and material. Measured volumes are spread exactly where wanted. It operates equally efficiently in forward or reverse motion, and varying speeds do not affect the accuracy of spread. Efficient for new work, resurfacing or patching—it works close to guard rail or obstructions—spreads full width of the machine. Write today for complete bulletin and prices.

BID THE Buckeye WAY ... ask for our operation data before you bid

The BUCKEYE TRACTION DITCHER CO. Findlay, Ohio

"If a man can make a better Mousetrap . . . than his neighbor — though he build his house in the woods — the World will make a Beaten Path to his door."
RALPH WALDO EMERSON

The PATH that leads to BAY CITY
is Broad and Well Beaten!

—Bay City, Mich., is not *quite* in the woods.
—*Some* credit for the path is due the State Highway Dept.
—Bay City machines have *not* been called "Mousetraps".

MODEL 38 ⅝ cu.yd. BAY CITY — 1 of 10 SIZES

But the signposts plainly read — "Successful and Dependable Performance".

BAY CITY owners are enthusiastic users — they do not keep their good judgment secret. They tell others Bay City machines perform better, more efficiently and economically than any other shovel they have ever owned. They are repeat buyers — not stampeded by high-pressure selling, but select what they think most desirable in design and performance.

When they *select* — they BUY BAY CITY.—

And buy with confidence.

BAY CITY is completing the biggest sales volume in its history. There is a reason . . . Ask us—we'll give you the evidence . . . Ask a Bay City Owner — or better still, join the growing list of Bay City users and experience new heights of equipment satisfaction.

10 Models — ⅜ yd. to 1¼ yd.

Sensibly Designed—Honestly Advertised—Fairly and Moderately Priced.

25 REASONS FOR CHOOSING BAY CITY

1—Convenient economical weight.
2—Helical cut gears—noiseless, long wearing.
3—Unit (nickel-manganese) car body and machinery table, totally heat treated.
4—Frictionless bearings throuout.
5—6-cylinder powtr.
6—Extra large diameter swing roller-path.
7—Oversized clutches & brakes.
8—Drop forged crawler shoes.
9—Long crawlers — low bearing pressure.
10—Chain crowd with automatic adjustment.
11—Swing lock—in any cab position.
12—Automatic Travel lock.
13—Extra heavy cab. Plenty inside working room.
14—Fast operating speeds.
15—Two travel speeds.
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17—Three lever control.
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19—High pressure lubrication throuout.
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22—Internal swing teeth.
23—Unequalled steering at full speed.
24—Convertible—without machinery change.
25—Accessibility for inspection or adjustment.

Recent Quantity Purchasers: 8 Model 20's State of N. Y. Dpt. of Pub. Wks.; 8 for New Zealand Pub. Wks. Dpt.

Send for details

BAY CITY SHOVELS Inc. Eastern Offices, Roselle, N. J. BAY CITY, MICH.

Nevada Builds Own Striping Machine

(Continued from page 1)

it is possible to stripe in the extreme southern part of the state during the winter, when it would be impossible in the northern part. Thus, a self-propelled machine capable of cruising at a fairly good speed could be driven from the north after completing its work there, and be used during the winter in the south.

These features meant that only a very few machines would be required to carry on striping operations for the entire state.

The conventional push-type striper does not provide protection for its operator. In striping blind curves with this type of machine, a careless speeding automobile driver is apt to disregard warning signs and crash into the unit. Therefore, the experimental machine would have to provide at least a measure of protection for its operator.

Highway departments in other states have designed and built stripers to be pushed by a truck. On narrow roads, a wide truck, proceeding down the center of the road during striping operations, presents a traffic hazard, and obstructs the normal flow of traffic. The experimental machine would have to be as narrow as possible and, while operating, not obstruct the flow of traffic in either direction.

Striping in the northern part of the state can be done only during the months of May, June, July, August and a portion of September. During these months, sudden gusts of wind are likely to spring up and, unless some provision was made, would strike the machine from the side, scatter the paint being sprayed, and leave a very ragged line. This meant that some protective device surrounding the spray head would have to be developed.

It is granted that a machine having these features and capable of painting 20 miles or more of stripe in eight hours would be an ideal piece of equipment. To do this, the machine itself would have to carry a large supply of paint in order to eliminate frequent stops to replenish its supply. Also a system of "natural" alignment, so the operator could easily follow a straight line or curve, would have to be developed.

The Machine As Built

The machine which was built to meet these specifications is an automotive type rear-wheel-drive unit, with a 94-inch wheelbase and a maximum width of 50 inches. It has a cruising speed of 45 miles an hour, and a painting speed of 4½ to 5½ miles an hour, depending on the skill of the operator.

An offset guide wheel, which can be swung up and fastened when cruising, is mounted on a frame at the front of the machine. When marking, the wheel runs on the road and effectively lines up the machine for accurate marking, as the wheel, the steering column and the spray head are in line.

The operator is seated in the left center of the machine. The motor in the rear and the paint container in the front provide collision protection for the operator. Two seats are provided, one for the operator and one for a relief operator. The machine originally had only one seat, but it was found that the machine striped so rapidly that one operator could stripe only about 8 miles and then was forced to rest his eyes.

The paint container, located at the front of the machine, holds 65 gallons of paint. The sloping portion of the container is a hatch provided for cleaning. A mechanical agitator is mounted just back of the sloping hatch and can be disengaged with a clutch, depending on the type of paint used, or when cruising. A two-horned handle towards the rear of the container is used to hold the filling hatch tight. An adjustable non-clogging self-cleaning spray head assembly of unusual design is located directly under the operator's seat. The compressor, which may be disconnected by a clutch when cruising, is located at the rear of the machine.

With more or less inexperienced operators, but under actual striping conditions, the machine has painted 27 miles of excellent stripe in six hours. In one test, the machine left its base at 10 A. M., was driven 35 miles to the job, did 14 miles of striping, and was back at its base at 4:20 P. M.

The illustration on page 1 shows the completed machine with the operator and relief operator in position, just starting to paint. The relief operator has just risen from his seat to ascertain the condition of the new line. Note the narrow line ahead of the machine, and the wide newly painted line in the rear. This picture was taken on a piece of newly constructed road, and the narrow line ahead of the machine had previously been surveyed and marked by placing a rope from station to station, and daubing along the side of it with a long-handled narrow brush. This narrow line merely serves as a guide line, and is necessary only on new construction. Once the permanent wide line has been laid the machine follows it when it becomes necessary to repaint it.

This machine was designed by W. S. Holsworth, Equipment Superintendent of the Nevada State Highway Department, and was built at the Equipment Headquarters at Reno. Many of the refinements were suggested by H. Hawkins, head machinist at the Equipment Headquarters.

Uniform state laws governing highway travel, the replacement of vehicles built before the development of modern safety features, and continued efforts to impress on the driving public that "It's smart to drive safely," are three chief ways by which America's appalling highway accident toll can be reduced, according to a recent statement by Robert F. Black, President of the White Motor Co.

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Below are authentic photographs of test pistons taken after exacting laboratory tests. The piston photos have *not been retouched*. Read the captions under each photo—they tell the remarkable story of Sinclair Ten-ol's outstanding superiority. It will mean a tremendous saving in your own Diesel operation.

Sold by your local Sinclair representative.

Sinclair Ten-ol is recommended as a "New Outstanding Diesel Engine Lubricant" by the Caterpillar Tractor Co. Order Sinclair Ten-ol, Sinclair Diesel fuel and other Sinclair products from your local Sinclair office or write Sinclair Refining Company, 630 Fifth Ave., New York City.

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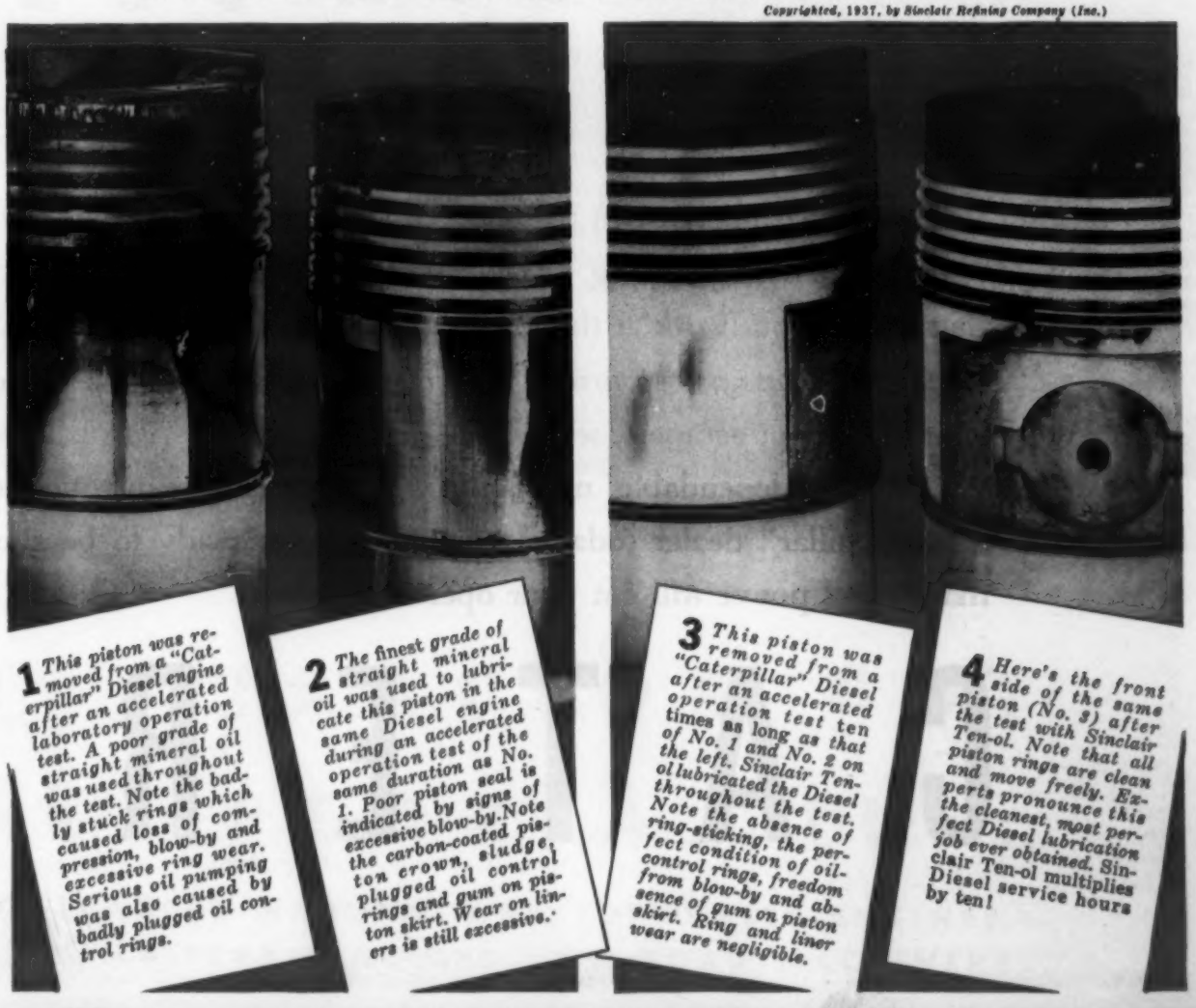

1 *This piston was removed from a "Caterpillar" Diesel engine after an accelerated laboratory operation test. A poor grade of straight mineral oil was used throughout the test. Note the badly stuck rings which caused loss of compression, blow-by and excessive ring wear. Serious oil pumping was also caused by badly plugged oil control rings.*

2 *The finest grade of straight mineral oil was used to lubricate this piston in the same Diesel engine during an accelerated operation test of the same duration as No. 1. Poor piston seal is indicated by signs of excessive blow-by. Note the carbon-coated piston crown, sludge, plugged oil control rings and gum on piston skirt. Wear on liners is still excessive.*

3 *This piston was removed from a "Caterpillar" Diesel after an accelerated operation test ten times as long as that of No. 1 and No. 2 on the left. Sinclair Ten-ol lubricated the Diesel throughout the test. Note the absence of ring-sticking, the perfect condition of oil-control rings, freedom from blow-by and absence of gum on piston skirt. Ring and liner wear are negligible.*

4 *Here's the front side of the same piston (No. 3) after the test with Sinclair Ten-ol. Note that all piston rings are clean and move freely. Experts pronounce this the cleanest, most perfect Diesel lubrication job ever obtained. Sinclair Ten-ol multiplies Diesel service hours by ten!*

Large Mileage Unsafe In Spring, Says Report

Nearly 4,000 miles of Indiana state highways were posted last spring to protect the traveling surface by restricting traffic to vehicles having a gross weight of less than 3 tons. Reports from district engineers of the Highway Commission show that during this same period approximately 1,555 miles of state highways were found to have inadequate strength to carry the traffic. The majority of the highways having inadequate base strength were included in the group which had been posted.

A report recently filed by J. T. Hallett, Assistant Chief Engineer of the Indiana State Highway Commission, points out that these weak links make it "very evident that the state highway system is not nearly complete nor as adequate to meet the demands of the traveling public as a number of persons seem to think it is. Funds for highway purposes to be spent on the highway system should not be decreased below what they have been for the last several years and", says Mr. Hallett, 'I believe it would be a measure of economy to the public if a greater amount of funds would be made available, because inadequate highways cost the public more than adequate highways and are much less satisfactory."

Indiana is only one of a large group of states where frost boils laid low extensive mileage of state highways last spring. The expenditure of large sums of money will be necessary to drain properly these vast areas where frost boils occurred in order that the foundation of these roads may handle heavy traffic at all times.

Hopkins Joins Wellman

Announcement has been made of the election of John C. Hopkins to the position of Vice President and Sales Manager of the Wellman Engineering Co., Cleveland, Ohio. Mr. Hopkins, who is widely known throughout the steel industry, having served with a number of companies, the latest being the General Refractories Co., for which he was District Sales Manager in the Cleveland office, took his new position on January 1.

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Put your own operator in the seat . . . keep your own figures on its operating costs . . . doing work on your own job. Here's a tractor that will do your work at the lowest possible fuel and up-keep costs!

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Bulldozer Operator Buys N. Y. World's Fair Bond

The enthusiasm for the New York World's Fair of 1939 has been expressed concretely by the purchase of a $100 Fair bond by John C. Weir, Jr., of Flushing, N.Y., from Grover Whalen, President of the Fair Corporation. Weir is a bulldozer operator who wrote a personal letter to Mr. Whalen telling him to drop off some time near Dragline 34, Truck 29 and sell him a bond if he had time. The operator gave Mr. Whalen a $100 bill for the bond, hopping off his machine just long enough to make the purchase and then jumped back, threw his machine into gear and began pushing the piles of ash fill around again.

Pacific Coast Offices of Lima Loco. Wks. Moved

The Lima Locomotive Works, Inc., Shovel and Crane Division, of Lima, Ohio, has announced changes in the locations of its Seattle, Wash., and San Francisco, Calif., offices. The Seattle office, formerly located at 2244 First Ave., So., has been moved to 1932 First Ave., So. The San Francisco office, formerly located at 26-32 Fremont St., is now located at 200 Bush St.

Both of these offices carry a complete line of repair parts for immediate delivery. There has been no change in the personnel of either office.

Interest in Roads Points To Political Unity in China

There is probably not one province in China which is not actively interested in some phase of highway improvement and construction. The Highways Section of the National Economic Council is serving as a coordinating agency in assisting with plans and suggestions to make the provincial roads contributory to the national highway system. A report from the U. S. Bureau of Foreign and Domestic Commerce states that probably no other single factor in the economic developments of the country today point more definitely to substantial progress in political unity than the extensive work that is being done in the development of this network of provincial highways.

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TRACK-TYPE TRACTORS AND ROAD MACHINERY

Lighting Rural Roads When, Where, How

A Traffic Engineer's Ideas of Highway Lighting and the Method of Approach

By EARL J. REEDER
Chief Traffic Engineer, National Safety Council

TRAFFIC engineers, highway engineers, and other public officials are asking whether highway lighting is another reputed panacea for a large percentage of the traffic accidents and they are waiting for its real value to be demonstrated. Perhaps it is fortunate that it is so for, otherwise, it might go the way of the other important remedies for traffic accidents and build up official and public reaction against it.

If there is any one thing which I wish to contribute to highway lighting, it is to emphasize the importance of the accident-experience approach in determining these requirements. Because that approach has been so important in the application of other remedies and because it has so often taken costly experience to learn it, I shall feel that I have done the highway lighting industry a real service if I can help to avoid the vicissitudes which other accident remedies have suffered.

One of the fallacies which has often led to the misapplication of remedies to assumed problems has been the belief that casual observation of an intersection, a curve, or other highway location will show whether or not it is prone to accident and what kind of remedy ought to be applied to this apparent accident proneness. The difficulty there is that the hazards which are so apparent as to be revealed by casual observation are so apparent to everyone who passes that all drivers and pedestrians avoid accidents at such places. However, accidents do occur where the hazards are not so readily apparent as to be plainly visible to every driver or pedestrian who approaches, and these persons become unexpectedly involved in conditions which they have not foreseen and cannot quickly understand when discovered. It has been found necessary to depend upon the accident experience to reveal the high-accident locations and to furnish the clues as to the remedies which are necessary. Hence, the spot map and the collision diagram have become the most important tools in the kit of the traffic engineer.

Traffic engineers will welcome the day when it will be possible to examine the conditions at any given highway location and predict accurately the type and extent of the accident experience that will occur if corrective measures are not taken. That day has not yet arrived and it will arrive only through the accumulation and analysis of accident data from a great many high-accident locations. The similarity of conditions at locations of similar accident patterns must be determined and compiled. The effect which variations in these conditions have upon the type of accident experience must be studied. Then, and only then, will it be possible to predict from an examination of the physical conditions and the characteristics of the traffic, the accident experience.

This is just the kind of treatment which I am convinced must be applied in determining the need for highway lighting. While studies so far have shown that there is a general relation between highway lighting and accidents, those studies have not differentiated between the points that require highway lighting for safety and the points which do not. We know that accidents do not occur uniformly along a highway at the rate of so many per mile. They do not occur in proportion to the volume of traffic. They group at certain points and the patterns at different points are different. Even the night and day experiences are different at successive points along the same highway.

Spot maps of accidents on important rural highways prepared by Reynolds G. Weaver, Traffic Engineer of the Oklahoma State Highway Commission, and Harry H. Harrison, Traffic Engineer of the Illinois State Division of Highways, show how widely the accident patterns differ and how necessary is a study of the accident experience at each high-accident location to determine the need for whatever type of remedy may be under consideration. They show some sections of the highway which were relatively free from accidents for several miles, followed by other sections which had high concentrations of accidents within short distances. They show some sections that had numerous day accidents, and few night accidents and other sections of the same highway with many night accidents and few day accidents.

High-Accident Factors

Several factors enter into the accident pattern at any high-accident location. There is the highway itself made up of turns, curves, tangents, and intersections, all of various widths, cross sections and grades. Then, there are the surroundings of the highway—business districts, residence districts, forests, embankments, and many others which influence the driver's performance on the roadway. Again, there is the amount and character of traffic which the driver encounters as he uses it.

Driving is the process of taking all of these various conditions into account and operating the vehicle so as to avoid accidents from the hazards which they produce or the false appearance of safety which they may give. Where the problem of driving is simple and clearly understood, drivers have little difficulty. They may even pass through complex conditions if they can see them plainly and traverse them cautiously. If, however, they come upon these conditions unexpectedly and must make quick decisions on unexpected appearances, the decisions are more frequently wrong, and such locations are accident prone. It is necessary, therefore, to provide such restrictions, control equipment, safeguards or illumination as are necessary to make conditions appear to the approaching driver as they really are or to so inform him that he may

(Continued on page 27)

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Hug offers hauling units individually engineered to meet *your* requirements—whether they be roadbuilding, batch hauling, dirt and excavation work, stripping, quarrying or any other type of dump truck service. For example, Hug equipment includes such features as the Hug front axle rocker action with the new universal spring shackle; the rugged arc welded "I" beam frame; the set-back wheel design with resulting short turning radius and equalized load distribution; double reduction rear axle; wide variation of transmission speeds from low-low to over-gear drive; heavy duty spring design; bodies and hoists designed to meet a wide range of hauling requirements and built with the chassis as an integral unit.

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● *Model 87Q with 6-yard Easton Phoenix side dumping Quarry body.*

● *At left: Model 87K Hug Roadbuilder with Hug 5-yard Excavation type body.*

● *At right: Model 87Q with standard 6-yard Hug Scoop-End body, U-shaped "I" beam side braces and equipped with high dumping angle power hoist.*

$2,500,000 for Roads in Public Lands Areas

The apportionment of $2,500,000 for the construction of main roads through unappropriated or unreserved public lands, non-taxable Indian lands, or other Federal reservations, other than national forests, during the fiscal year 1938 has been completed by the Secretary of Agriculture. Authorization for this class of work was first made in 1930 and the new apportionment brings the total funds appropriated to date to $17,500,000. Previous authorizations have provided for the construction of more than 1,400 miles of low class road.

The new apportionment is as follows:

Arizona	$ 378,077
California	235,638
Colorado	88,688
Idaho	122,609
Montana	137,774
Nevada	560,201
New Mexico	206,844
North Dakota	32,611
Oklahoma	28,935
Oregon	148,367
South Dakota	54,497
Utah	256,296
Washington	38,349
Wyoming	191,114
Total	$2,500,000

Both Farmer and City Man Need Highway Lighting

America has the men, money, materials and knowledge necessary to bring about a change to good visibility on its main-line rural highways at night, R. E. Simpson, Illuminating Engineer for Travelers Insurance Co. and Consulting Engineer for the National Bureau of Casualty and Surety Writers, recently told a rural radio audience.

"What we do not have is a public aware of the facts and therefore sufficiently aroused to insist upon action which will remedy the situation," he declared.

Farmers should be interested in the reduction of automobile accidents, because they travel the highways to a greater extent than ever before, particularly during the hours of dusk and darkness when most serious accidents happen. Highway lighting would cut these night accidents in half, just as adequate street lighting has decreased night-traffic deaths 50 per cent in urban centers, Mr. Simpson said.

In the midst of a rising market on all the materials that go into LeTourneau equipment we are able to cut prices because of the fine business we are doing. This business, we believe, has come to us because LeTourneau equipment in the hands of hundreds of users has so thoroughly job proved its ability to move dirt cheap. As a result, our volume has grown to a point enabling us to make worthwhile savings in production costs. These savings are being passed on to you in price reductions of 5 to 20% on the entire LeTourneau line of Angledozers*, Bulldozers, Carry-all* Scrapers, Buggies*, Drag Scrapers, Cranes, Rooters*, and Power Control Units.

BULLDOZERS, ANGLEDOZERS

With this price cut, LeTourneau Angledozer and Bulldozer prices are as low, if not lower, than any others now on the market. Ask your Caterpillar tractor dealer for a demonstration and convince yourself of their superiority in performance as well as price.

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C. & E. M. Photo
Surface Mixed and Rolled But Not Sealed

A 6.4-Mile Retread Job in West Virginia

(Continued from page 1)

the Adams retread mixer through it once. If the base, or the stone, was wet, the stone was windrowed to one side with the machine until that section had dried, then windrowed to the other side and later spread over its 9-foot width. The retread mixer wheels were 8 feet apart and the axles 26 feet apart, insuring the leveling out of irregularities in the base as the final surface of the road had to pass inspection with a 16-foot straightedge with allowance for only ¼-inch variation in the 16 feet.

The Retread

Only one-half of the road was worked at a time, leaving the other open to traffic. Vehicles are not allowed on the retread surface until the aggregate does not pick up on the tires. This is usually a matter of only two or three days. After the stone was spread, it was "shot" with 0.25 gallon per square yard of the TM-2 tar by the 800-gallon distributor and the retread machine was immediately pulled through the stone by a Caterpillar Sixty gas tractor to mix it. Then a second application was made at the same rate and the mixer again run through it and the material spread to its 9-foot width.

On the following day the section that had been mixed was rolled with a 10-ton Hercules gas roller equipped with an Ironer Roll. Rolling was continued on the second day following mixing or when the material had properly seasoned to permit of the best compaction under the roll.

With its many hills West Virginia insists on adequately super-elevated curves to permit reasonable speeds on grades and for safety of motor traffic. The Superintendent on this contract called attention to one feature of the retread machine in particular that was of great service in building the super-elevated sections on curves. This is the gate or "rudder" back of the last pair of diagonal mixing blades which permits throwing more of the mix to one side of the strip than to the other so that the spreader blade at the rear of the machine may level off at a higher elevation on the outside of a curve and have sufficient material to carry the super-elevation throughout the length of the curve.

Surface Double Sealed

After a sufficient length of road had been completed to permit of economical sealing, a first seal of 0.3 gallon per square yard of the TM-2 tar was distributed and covered with 20 pounds of No. 12 chips, ⅜ to ½-inch, spread over the surface with a Handy Sandy chip spreader. This was broom-dragged, with a broom designed especially for this purpose by the American Bitumuls Co., until it had seasoned. Then the surface was rolled to full compaction. This seal was repeated for the second, using 0.25 gallon of the same tar and 10 pounds of the chips and then rolled. This produces a smooth riding non-skid surface at a reasonable cost and satisfactory for secondary roads.

Labor and Hours

The work was started on this retread job on April 20 and completed before June 27. Two shifts of 20 men per shift worked 5 hours a day with a maximum of 30 hours a week.

Personnel

The Keeley Construction Co. was awarded this 6.4-mile retread job on its bid of $34,494.00. Walter M. Linn was Superintendent for the contractor and A. B. Osborne was Engineer in charge for the West Virginia State Road Commission, of which Mortimer W. Smith is Chief Engineer.

The opening of the 222-mile section of the Pan American Highway in Argentina, extending from Buenos Aires to Rosario, was inaugurated recently by President Agusto P. Justo. The section of road is 20 feet wide and is paved with reinforced concrete, except for 30 miles out of Buenos Aires.

A Speed Patrol Catalog

A new catalog containing information on the complete line of Allis-Chalmers speed patrols with action pictures showing the machines working under many different operating conditions has just been issued by Allis-Chalmers Mfg. Co., Tractor Division, Milwaukee, Wis. The various features of the patrols are described and illustrated with photographs. Several pages are devoted to the tandem-drive models brought out early in 1936 with either four or eight-wheel tandem assemblies and a choice of either gasoline, distillate or diesel-fuel-burning engines.

Details of the controlled ignition diesel fuel engine are given. This type of engine has been used for several years in A-C tractors.

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"Flex" signifies flexibility. "Plane" signifies plane joint. When used at close intervals, "Flex-Plane" joints form a road vertebrae. Use "Flex-Plane" joint installers for all contraction joints, also "Flex-Plane" finishing machines—there are none better. Write for complete information.

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YELLOW TRUCK & COACH MANUFACTURING COMPANY, PONTIAC, MICHIGAN

Lessons in Arc Welding for New Operators

To provide arc welding operators with a thorough working knowledge of the practical application and use of arc welding, the Lincoln Electric Co., Cleveland, Ohio, has re-issued in enlarged form its volume "Lessons in Arc Welding." This illustrated volume now contains 44 lessons and approximately 130 pages, compared with 28 lessons and some 60 pages in the original edition. Approximately 10,000 copies of the original edition, published three years ago, have been purchased by operators. The lessons are based on the course in arc welding which has been conducted by this company in its plant for nearly 20 years and are the result of experience in teaching thousands of men to become practical arc welding operators. The book is mimeographed on 8 x 11 pages with a durable binding and copies are mailed postpaid to any address in the United States for 50 cents each and 75 cents outside the United States.

A. W. Daniels Heads Universal Crusher Co.

A. W. Daniels, formerly Vice President in charge of sales of the American Manganese Steel Co., became head of the Universal Crusher Co., Cedar Rapids, Iowa, on January 1. He succeeds W. L. Harrison who has directed the progress of the Universal organization since 1912. In his new association, Mr. Daniels will have with him H. F. Rikhoff, formerly of the American Manganese Steel Company.

Mr. Daniels has long been identified with industries that use crushing equipment, having been in his former position for some 18 years and more recently having served as Executive Officer of the Rock Crusher Manufacturers' Association, and as Secretary-Treasurer of the Manganese Steel Founders Association. He is also connected with the Daniels-Murtaugh Co., of Chicago, maker of dippers, dragline buckets, dipper teeth, and other shovel equipment and with several other Chicago companies.

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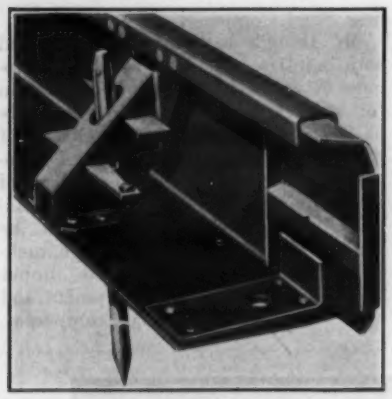


The New Blaw-Knox Self-Aligning Road Forms

Self-Aligning Road Forms

The self-aligning feature of the new Blaw-Knox road form, recently announced by the Blaw-Knox Co., 2067 Farmers Bank Bldg., Pittsburgh, Pa., is accomplished with two wedges on each of the stake pockets. The upper wedge is operated by hand until it contacts the stakes. This takes up the usual clearance between the wedge and the stake, eliminating movement of the form when final locking is done.

The lower wedge is then driven up with a hammer for final locking. This prevents movement of the form from line or grade, and permits quick and accurate form setting, even though the stakes be bent or driven crooked, according to the manufacturer.

High-Speed Diesel Engines Interchangeable With Gas

The Hercules Motors Corp., Canton, Ohio, has announced a new small QX series of 6-cylinder gasoline engines and the DJX line of light, high-speed automotive diesels of 260 cubic inches and 298 cubic inches displacement. Like the larger Hercules diesels these newer and smaller engines, designed primarily for high-speed use, have the patented Hercules pre-combustion chamber which assures a clean exhaust, unusual economy and exceptional performance ability. The DJX diesels are interchangeable in mounting dimensions with the extensively used JX series of Hercules gasoline engines.

Charles P. Weekes, Vice President, Hercules Motors Corp., who recently attended the Paris Automobile Salon where Hercules gasoline and diesel engines were exhibited, reports a large increase in the export of Hercules engines. Hercules diesels are now being distributed and will soon be built under Hercules patents by Ruston & Hornsby, Ltd., of Lincoln, England, and by N. V. Kromhout Motoren Fabriek of Amsterdam, Holland.

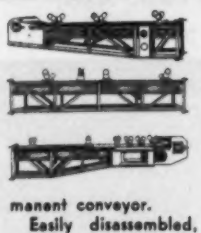
A Hercules installation which is attracting particular attention is the new diesel-electric drive recently announced by the Motor Coach Division of General Motors Truck Corp. and by the Twin Coach Corp. wherein a Hercules diesel engine is used to generate electric power which in turn drives these modern buses.

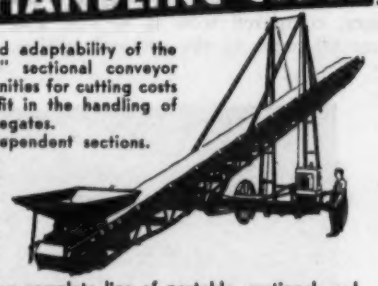
A Welding Foundation Inaugurated by Lincoln

Dedicated to the encouragement of study and research for the benefit of the arc welding industry, a new Foundation has been established by the directors of the Lincoln Electric Co., Cleveland, Ohio. This new fund has been named "The James F. Lincoln Arc Welding Foundation," in honor of the pioneer work of the president of the Lincoln Electric Co. in promoting arc welding and in developing arc welding equipment and electrodes. One of its primary functions will be the stimulation of original design in order that arc welding processes may be more widely utilized in modern-day fabrication.

Principal direction of the Foundation's work will be by Dr. E. E. Dreese, head of the Department of Electrical Engineering at The Ohio State University. Other trustees are W. B. Stewart, a member of the Cleveland Bar, and H. R. Harris, Vice President of the Central National Bank of Cleveland.

NEW WAYS TO CUT MATERIALS HANDLING COSTS





The flexibility and adaptability of the Porta "Model 347" sectional conveyor offers wide opportunities for cutting costs and increasing profit in the handling of concrete and aggregates.

Made up of independent sections. Can be used on wheel truck, caster mounting or on supports as permanent or semi-permanent conveyor.

Easily disassembled, easily transported, easily reassembled. Our catalog describes our complete line of portable, sectional, and permanent conveyors designed to suit every contractor's requirement.

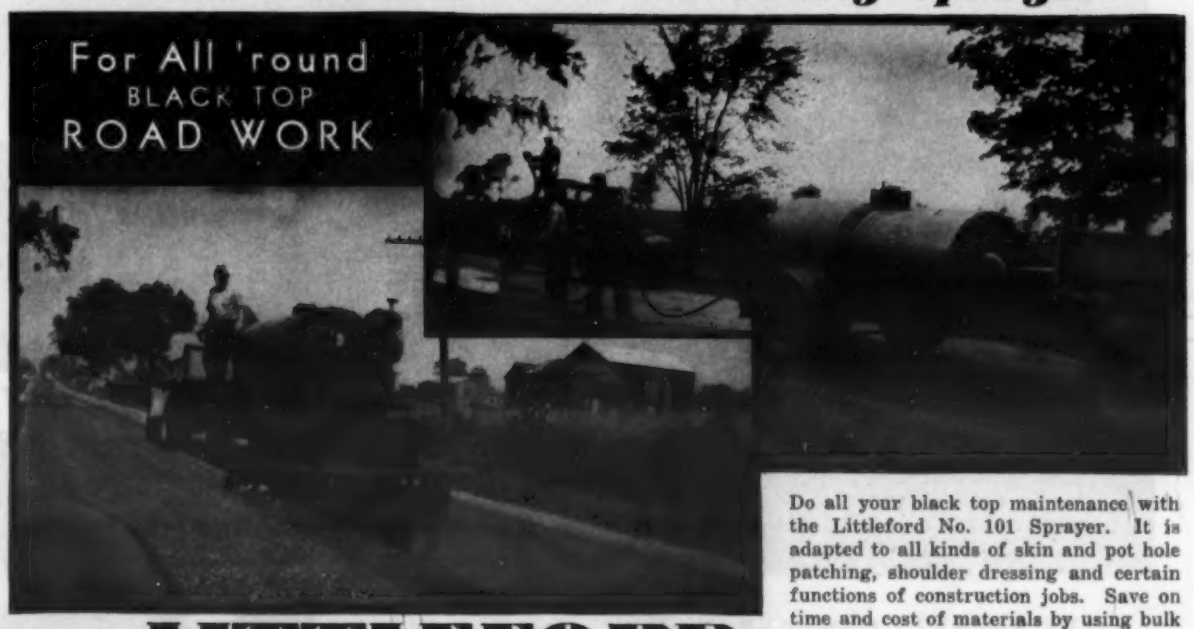
PORTABLE MACHINERY CO., York, Pa.; Clifton, N. J.; Chicago, Ill.

Instant Cut-off....without Dribbling.

With just a quarter turn of the control handwheel—instant, foolproof, positive, as simple as A,B,C.

Notice the 17 foot bar putting down a uniform, accurate spray in the view above. At right, an instant later—sprays have cut off as clean as a whistle, without a single dribble. Only with the Littleford Model "C" Pressure Distributor do you have LB Single Valve Control with "suck back" lines which enables you to do this. And this is but one of the many superior features of 1937 Model Littleford Distributors. Ask for prices and full details, now.

Use the Littleford No. 101 Utility Sprayer



Do all your black top maintenance with the Littleford No. 101 Sprayer. It is adapted to all kinds of skin and pot hole patching, shoulder dressing and certain functions of construction jobs. Save on time and cost of materials by using bulk bitumen. Use this pump type machine to advantage for transferring or barreling material in your yards. The No. 101 is rapidly gaining favor, everywhere. Sizes 300 to 1200 gallons capacity for truck, trailer or semi-trailer mounting. Write for complete information, now.

LITTLEFORD
Road Maintenance Equipment
SINCE 1900
LITTLEFORD BROS. 485 E. PEARL ST. CINCINNATI, O.

COMPACT—POWERFUL—SAFE
"For use where power is not practical or available"

Manufactured in 2, 5 and 15-Ton Sizes. For capacity comparison, ½" cable used:
2-Ton "Lightweight" ..... 75 ft.
5-Ton "General Utility" ..... 250 ft.
15-Ton Triple-Geared "Special" .....1200 ft.
Patent instant gear change and positive internal brake that never fails, and will lock load.

Gear Ratios	Weight	Price
2-Ton 4 & 22 to 1	60 lb.	$50
5-Ton 4 & 24 to 1	110 lb.	$75
15-Ton 4, 19 & 109 to 1	680 lb.	$200

BEEBE BROS.
3724 6th Ave., So., SEATTLE, WASH.
Warehouse stocks for dealers' supply: Seattle—Chicago—Brooklyn—Houston. Complete Literature and List of Dealers in Principal U. S. Cities and Foreign Countries Gladly Mailed.

Road Show Paragraphs

TEXAS Company had a "4 out of 5" demonstration with cheery bright lights to indicate cities of more than 25,000 population east of the Rockies that have Texaco pavement, and sad blue lights for the 20 per cent that have not yet heeded Tex appeal.

Harnischfeger showed some fine dentistry in nicely filled teeth of shovels and gears, as well as crawler rollers, and crawler plates, all repaired in the field with Hansen welders.

The Calcium Chloride Association on one revolving stand showed powerful toy autos mired in unstable mud, lost in dangerous dust, and then the same material properly mixed with gravel well bonded by moisture retained by —you guessed it—calcium chloride.

Truscon x-rayed a concrete road and showed just how steel bonds the roads on the one hand and controls cracks on the other.

We set up a tare weight of 94 pounds on the Fairbanks Printomatic Weigher and nobody seemed to be fooled a bit when our weight showed exactly 100 pounds. Lots of folks enjoyed getting their true weights, without tare, printed on green tickets to take home.

Twin globes scintillating with crystals (not of ice, for it was hot in New Orleans) revolved above constantly changing tinted transparencies of Rex construction equipment, flanking two movies, and in the center a cut-out of a Rex 27E paver which caught our eye because the bucket and skip were performing just as they should. Chain Belt had comfortable chairs too.

Heltzel's miniature finishing machine had a real vibrating screed that moved back and forth over some very realistic sections of concrete base, bituminus base and surface courses. As is usually the case, the model cost more to make than its full-size counterpart one meets on the road.

It rained throughout the entire daylight hours of the Road Show, in the Barrett Company exhibit. "It was all done with mirrors," diagonal screens and rotating cylinders with slots in them, but it looked as though that Tarvia road labelled "Safe in All Weathers" was getting an almighty soaking.

There always seemed to be a crowd of plutocrats occupying the chairs on the red raised dais of the Lima Locomotive Works. We never did get a chance to sit down there; too many ahead of us and they looked so darned comfortable and contented.

Novel rotating panels of colored enlargements of the wide Blaw-Knox line caught the eye with the chrome trim and the unfailing regularity with which each of the four triangular frames started to turn just as the next one settled comfortably into place.

The Keystone Driller Co. had a center feature of a cut-out of a Keystone excavator with a skimmer scoop replete with cables and we caught a lot of folks watching to see when it was going to start moving. That's holding attention!

Koehring's merry-go-round had photos of equipment and matches galore, both worth using, and the gorgeous red setting attracted a lot of sitting by folks who wanted to visit as well as those whose "dogs were barking."

The B. P. R. put up another of its striking dioramas with realistic scenes in highway history, the last showing the safe highway and clover leaf of 1937.

The hydraulic control demonstration of Link-Belt's Speed-o-Matic was an eye opener. The shovel runner's job is made much less fatiguing. And we voted for the adjustable seat that fits Long Legs and Shorty. The front seat in our Dodge is adjustable but there are lots of places, like certain New York theatres, where that kind of a seat could make many more happy customers.

Johns-Manville showed sections of extruding poured joints and self-expanding joints and how they act summer and winter for two years. And the poured joint wasn't too much exaggerated for effect either.

Austin-Western held a unique guessing contest with a $100 prize. They didn't ask how many times a Mexican bean would hop, skip and jump during working hours in the first three days of the show. It was a real sensible contest that required knowledge of the other fellow's equipment as well as A-W. Transparencies showed ideas which Austin-Western has pioneered in road construction machinery and they asked you to tell how many other companies are now using similar ideas. Not a bad quiz! They had talkies which included a tuneful, but loud, band.

Other interesting movie exhibits included Caterpillar, Portland Cement Association and "The Little Theatre in the Alcove" that replaced "The Little Theatre on the Ramp" of Cletrac fame. Excellent pictures of bull fights in Mexico, the International Highway in Mexico and other films, replaced the Antarctic movies of last year. We could have made use of a little breath of Antarctic in the Auditorium where it was very warm and the ventilation terrible in spite of the battery of cyclone, hurricane or induced draft pedestal fans that was imported.

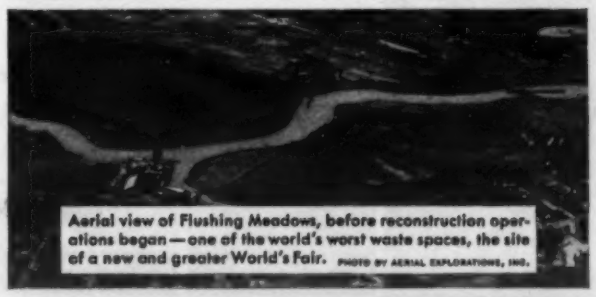
In general, manufacturers are to be congratulated on the attention they gave to producing well-designed finished exhibits and backgrounds that attracted attention and held it. T.R.K.

P.S. What little out-of-the-way-restaurant did you dig up in the Vieux Carre? Our favorite is the Court Yard Kitchen at 820 St. Louis St., where at little tables set out under semi-tropical trees and banana palms you can breath real old New Orleans atmosphere. We were delighted to find, in one corner of the garden, a huge iron cistern, dated 1831, reputed to be the first water works in the Crescent City. (Not an Adv.)

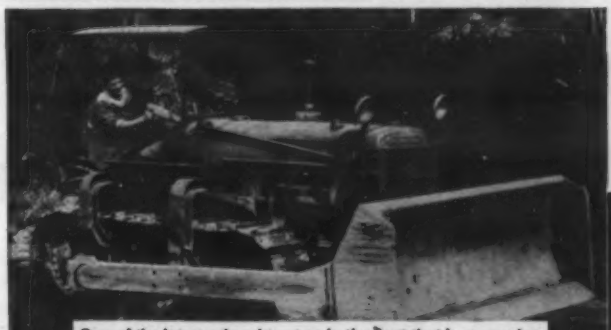
Among the new projects planned in Peru is the construction of a concrete highway 46 miles in length between Ica and Pisco, bids for which have been asked. This is an unusually big enterprise in this type of work for Peru.

INTERNATIONAL Crawler Tractors
LAY GROUNDWORK FOR
NEW YORK WORLD'S FAIR 1939

Twelve hundred acres like this—7,500,000 yards of swamp and rubbish to handle in a race against time. Where these international crawler tractors are operating today, the world will see a $125,000,000 exposition in 1939.



Aerial view of Flushing Meadows, before reconstruction operations began—one of the world's worst waste spaces, the site of a new and greater World's Fair. PHOTO BY AERIAL EXPLORATIONS, INC.



One of the International tractors in the fleet that is surpassing contractors' expectations on the site of the Fair.

The ancient Brooklyn Ash Dump in the Flushing Meadows on Long Island—miles of man-made desert where Manhattan and Brooklyn have heaped their rubbish for forty years—is a scene of great activity this winter. In 1939 New York City will entertain you there at a greater World's Fair.

Right now it's a job for the Johnson-Necaro Co., who shouldered a $2,000,000 contract to handle 7,500,000 yards of tangled refuse in a race against time. On April 1 they will deliver parks and lagoons where they took over chaos in the form of ashes and old iron.

The Johnson-Necaro Co. is coming on fast with International TracTracTors—the crawler-tractor product of International Harvester. A fleet of T-40 TracTracTors and bulldozers has been on the job for months now, handling 90 per cent of the vast yardage of material coming from the shovels and dump wagons.

Out there on Long Island today W. R. Staehlin, general superintendent, will tell you about how much these tractors can take, and how they perform while taking it. William Beattie and Charles Downing, chief engineer and general master mechanic, respectively, prove to us that what we claim about International service, and about accessibility of working parts, is understatement. And A. D. Saunders, operating vice-president, goes over the whole matter and says "That goes not only for me but for everybody on the job. I'd duplicate the entire order right now if we needed to."

This wouldn't mean so much coming from a green outfit, but the Johnson-Necaro organization is "tops" in the East. They have taken care of a $200,000,000 total in subway, tunnel, and other work in Metropolitan New York. They know crawler tractors from A to Z—*now*.

• • •

INTERNATIONAL HARVESTER and its full line of International industrial power—*wheel and crawler tractors, power units,* and *motor trucks*—are at your service. Call on any dealer or branch.

INTERNATIONAL HARVESTER COMPANY
606 S. Michigan Ave. Chicago, Illinois

W. R. Staehlin, general superintendent of the Flushing Meadows project. His grandfather held the chair of mathematics at Heidelberg, but Staehlin is no "chair" man. Thirty-two years on the job for the Arthur Johnson Co. have taught him volumes about the practical handling of heavy contracts. A big revelation to him of late has been the efficiency and economy of International TracTracTors.

INTERNATIONAL HARVESTER
INDUSTRIAL TRACTORS . . . POWER UNITS . . . TRUCKS

Pennsylvania Road Treated with Salt

(Continued from page 1)

state considerable money. This is the way it happened.

Laboratory analysis of the road material on the 1.3 miles of Route 21-074, which was to be treated with salt for a width of 14 feet, showed that it needed 75 per cent fines for proper stabilization. This meant considerable haul. On the WPA job, however, the material looked much better and a test of it showed that only 45 per cent granular material was needed to stabilize it, with a salt binder. Since the material had to be disposed of by the WPA organization, they were very glad to haul it the 3 miles to the state job.

The original dirt road was shaped, rolled and used as a base while the material from the WPA project for the first or bottom layer was dumped into a Burch spreader and laid down 2 inches loose. Then, 1¾ inches of screenings were added with the same Burch spreader and the material bladed back and forth with a Galion power grader to mix it. When the material showed homogeneity, it was windrowed to the two sides of the road and the subgrade wet to dampness. The windrows were then spread to a uniform depth across the road and compacted to 2 inches with a 10-ton 3-wheel Buffalo-Springfield roller. The material was sprinkled during rolling, using an old wooden tank sprinkler pulled by a truck.

Another layer of the material from the WPA source and the screenings were laid down, mixed and windrowed. Then 2 pounds, per square yard, of rock salt, furnished by the International Salt Co., Scranton, Pa., was spread with a lime drill. This was lightly sprinkled. The common salt was spread only for the distance which it was possible to cover the same day. The windrows were brought from either side with a grader and shaped with a 12-foot wood drag, given a final wetting, and rolled. The resulting new road surface is 4 inches thick, well-compacted but is tapered for 3 feet on each side, with a 2-foot gutter left on each side. The accompanying illustration shows the character of the road surface and the manner in which the unstabilized gutter washed on a hill section while the salt-bound surface held up under heavy rains. The road is smooth, and rides quietly but is slightly dusty and is to be treated later with a small amount of calcium chloride as a surface dust layer.

C. & E. M. Photo

The Salt-Hardened Surface of the Road Shed Water But Heavy Rains Washed Out the Untreated Gutter

Streamlined Dump Body Of 7-Yards Capacity

A radically new design in open-end hydraulic-hoist dump bodies for use on heavy excavation, such as building dams or highways, has been announced by the Easton Car & Construction Co., 10 East 40th St., New York City. This new Model R-79 all-steel body is made of high-carbon plate steel surfaces and a structural steel frame both arc-welded and riveted. An hydraulic hoist, supplied and mounted with the body by Easton, gives a steep dumping angle.

The unusual shape of this body is scientifically designed and proportioned to give a maximum loading capacity per ton weight of body and hoist, a technically correct load distribution and facility in loading and dumping. A sturdy shelving of plate steel extends over the cab to protect it during loading. The capacity of the truck is 7 cubic yards but approximately 9 yards can be carried with a heaped load.

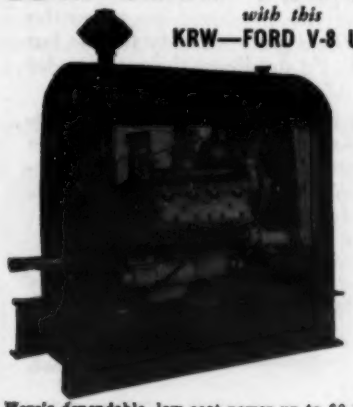
The Easton Model R-79 Dump Body

The correct load distribution of this body has a favorable effect on the riding characteristics and, consequently, on the life of the truck. This is important in view of the roads over which dump-body trucks are usually driven. A high ratio of loading capacity to body weight insures a greater pay load with the overall weight at the limit prescribed by law.

LOW COST POWER

with this

KRW—FORD V-8 UNIT



Here's dependable, low cost power up to 60 H. P. —complete, compact, portable. Ideal for welders, compressors, hoists, pumps, amusement devices, well drillers, agricultural and contractors' equipment, etc. For complete information, prices and data showing how a KRW Unit will pay for itself and *effect savings* in a few weeks, write us or see your local Ford Dealer.

ALSO KRW ELECTRIC PLANTS

Produce your own electric power at a fraction of present cost. Eliminate peak load and stand-by charges. The most complete plant ever devised—both 110 and 220 volts at same time—every protective device—20,000 watts. Runs on gasoline or natural gas.

K. R. WILSON, 21 Lock St., Buffalo, N.Y.

EXCLUSIVE BUILDERS OF APPROVED FORD SHOP EQUIPMENT SINCE 1920

Protect the Future of Highways and Bridge Floors

TRUSCONIZE

Every engineering principle incorporated in Truscon Steel Reinforcing Products meets all conditions involved in the construction, maintenance and protection of modern highways and bridge floors. A TRUSCON*ized* highway or bridge floor perpetuates a sound investment of taxpayers' money. Heavy traffic and extreme variations in temperature are effectively resisted by TRUSCON*ized* construction. Greater safety and minimum maintenance accumulate savings that make TRUSCON*ized* highways and bridge floors more economical over the years than any type of inadequate construction. The co-operation of Truscon engineers specializing on highway and bridge floor construction is quickly available. If YOU are directly or indirectly concerned with the construction of modern roads, streets and bridge floors, Truscon can provide practical assistance. Write for Catalog of Truscon Steel Reinforcing Products for highways and bridge floors.

TRUSCON STEEL COMPANY

YOUNGSTOWN • OHIO

PART OF THE COMPLETE LINE OF TRUSCON HIGHWAY PRODUCTS

The complete line of Truscon steel reinforcing products meets every requirement of modern road construction. . . . Every unit is engineered to enable contractors to perform better work in less time.

Vertical Drains in California Give Evidence of Success

While the work of draining swamp land in California by the use of vertical drains, described on page 5 of the November issue of CONTRACTORS AND ENGINEERS MONTHLY, is still being carried on by the California Division of Highways, tests show that no bulging has occurred at the site of the fill, except a slight bulge during construction, and a steady settlement of the fill has been going on, according to T. E. Stanton, Materials and Research Engineer.

Levels have been taken each week to check on the rate of settlement. When the surcharge has been removed, there will be an opportunity to observe finally whether or not the settlement resulting from this surcharge has been sufficient to eliminate subsequent settlement after the removal of the overload.

New Welding Electrode for Small A-C Machines

A new electrode, No. 520, has been announced by the Wilson Welder & Metals Co., 60 East 42nd St., New York City. It is claimed that this rod will work more satisfactorily with the small transformer type a-c arc welders, the welding performance of which has been somewhat hampered due to an unstable arc caused by the alternating current. Operators reported to find it exceptionally easy to handle and that it works equally well with a-c and d-c machines. Good looking bead deposits result and the slag interference is reduced to a minimum with the removal simplified.

50% MORE CAPACITY
FOR ONLY 20 to 25% MORE INVESTMENT

The ¾ yd. Lorain-40 weighs but little more than most ½ yd. units—isn't much bigger—operates faster—runs as economically—is as easily transported—and requires only a small additional investment which is quickly more than balanced by the greater yardage it will move and the increased profits it will earn you . . . Also, on a given yardage, you'll run a L-40 fewer hours, hence less operating costs, less wear and tear on the machine; additional savings to increase your profits . . . No wonder the ¾ yd. Lorain-40 has convinced so many contractors of its profit possibilities and proved itself to their satisfaction . . . In no other way could it have become *"The World's Fastest Selling ¾ yd. Machine."*

THEW CENTER DRIVE

THE UNIVERSAL CRANE COMPANY • LORAIN, OHIO

LORAIN·40·*The World's Fastest Selling ¾ yd. Machine*

Missouri R. Bridge Nearing Completion

(Continued from page 5)

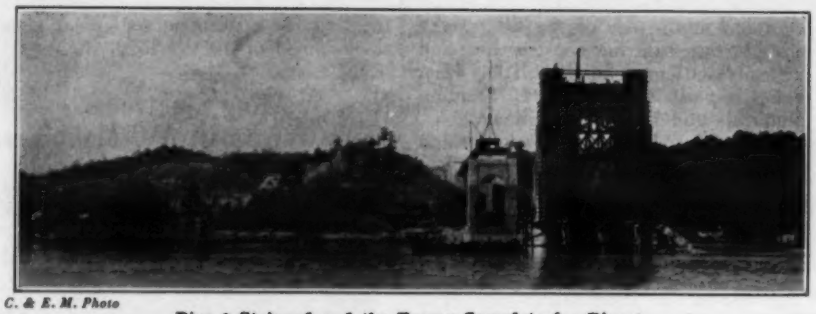
and the man and material locks were cast in the center of the seal. A platform for the men permitted them to gain the ladder from the center lock. During the operations under air a special barge completely equipped with the machinery and emergency apparatus for the sand hogs was tied alongside. It has the high and low pressure air compressors, both Ingersoll-Rand Imperial type units, pumps and the hospital locks. A smaller barge contained the hot showers, lockers and commissary for the men.

Concreting Plant

The floating concrete plant was moved about from one pier to another as needed and when the abutments on shore were being poured it was tied to a temporary trestle and the concrete taken in to the forms by industrial railway, using a dinkey and two cars.

The barge for the plant was a pair of 20 x 65-foot barges lashed together with six 15-inch I-beams. This double barge carried the Blaw-Knox bins and weighing batchers above the Rex 28S mixer. Aft of the mixer was the Sterling 3-inch centrifugal pump which pumped the highly turbid river water to an elevated tank alongside and above the mixer and between the two was a home-made measuring device for the mixer water. The concrete, which was mixed for 1 minute, was batched with 1,356 pounds of sand, 2,208 pounds of gravel and six bags of cement. The mixer man kept his concrete crew aboard the barge hustling with the production of 30 to 35 batches of concrete per hour right through his shift.

A gas-powered Lidgerwood hoist operated a 1-yard concrete bucket in a steel tower mounted immediately in front of the mixer. The concrete was dumped into a hopper at various elevations on the tower, depending on the location of the pour, and then delivered to the forms through an Insley chuting system and finally an elephant's trunk to the final location. All concrete was vibrated with an electric vibrator manufactured by the Electric Tamper & Equipment Co. with the electric unit mounted on the concrete barge and the wires for the vibrator unit carried over the top of the forms and into the work. In the concrete there were two vibrator men, two laborers and one man who



C. & E. M. Photo

Pier 3 Stripped and the Forms Complete for Pier 4

on the tower as it was not a standard unit and it required about 4 hours to make the shift from one elevation to another. This work was usually done by a steel crew who had the knack of this type of operation and took much less time than the concrete crew.

Serving the concrete barge were a derrick barge, two aggregate barges and controlled the elephant's trunk chutes with a rope. Considerable delay was experienced with the concrete hopper the cement barge. These were tied around the concrete barge with the derrick barge aft, the gravel barge to the right, the sand barge to the left with the cement barge just beyond it. The barges sent to the job by the Missouri Portland Cement Co. carried eight carloads of cement or about 2,000 barrels. The sacks were loaded on skips by three men and as fast as they were needed on the charging platform the derrick would drop the clamshell it was using to load the bins with the aggregate and lift several skips of the cement into location. The derrick barge carried an American Hoist & Derrick steam derrick which handled the 1¼-yard Kiesler clamshell bucket and the cement skips.

The labor organization worked two 5-hour shifts with a 30-hour week limit. The sand hogs worked an average of four hours per shift, the actual length of time depending on the depth at which they were operating.

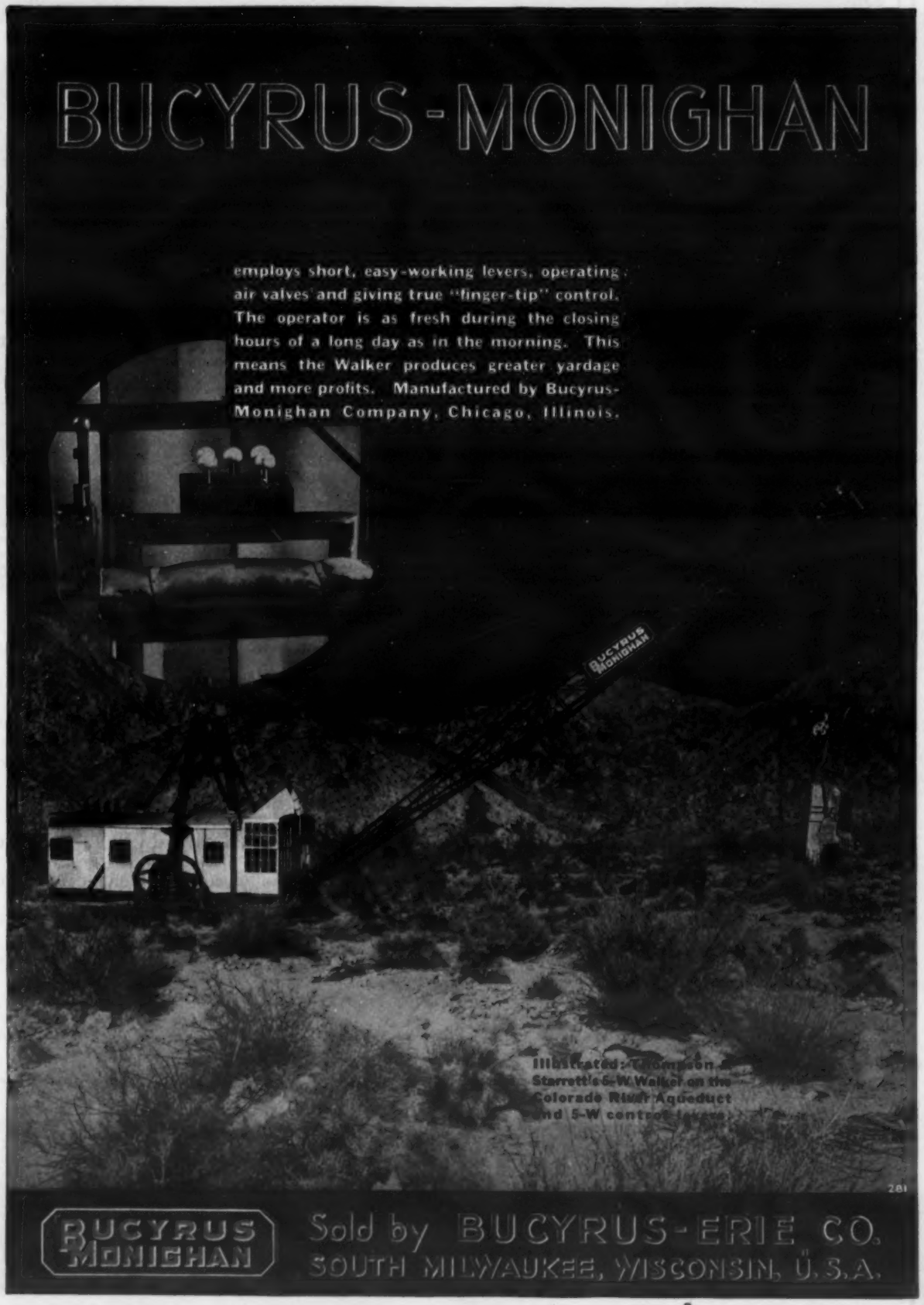
Personnel

The contract for this Public Works Project 2981 in St. Charles and St. Louis Counties was awarded to the Kansas City Bridge Co. for $1,221,670.70. Work has progressed rapidly and it is expected that the new free bridge will be opened for traffic in the summer of 1937. I. E. Hayes was Superintendent on the foundations and Charles Tupper, Superintendent on superstructure for the contractor. S. J. White was Project Engineer for the Missouri State Highway Department for the entire project.

Dial Scales Print Weight and Ticket Number

Platform scales with a dial and automatic printing system which will give both individual ticket and continuous printed records simultaneously is the latest development of Fairbanks-Morse & Co., Chicago, Ill., in the scale field. The new Fairbanks Printomatic Weigher has many applications in the construction field where payment for hot-mix, sand-asphalt and aggregates is made per ton.

On a normal 2,000-pound scale the capacity can be doubled, trebled, quadrupled or quintupled by a crank setting of drop-weights contained within the case. A double graduated beam below the dial scale is used to set up the tare weight of the truck so that the dial shows the net weight of the load which is printed in duplicate on the driver's ticket and the continuous tape. By the addition of an adding machine carriage to the recording equipment a total of the net weights may be taken off immediately at the close of the day's work or any time during the day. Designating numbers or letters to print simultaneously may be furnished to identify an operation.


BUCYRUS-MONIGHAN
employs short, easy-working levers, operating air valves and giving true "finger-tip" control. The operator is as fresh during the closing hours of a long day as in the morning. This means the Walker produces greater yardage and more profits. Manufactured by Bucyrus-Monighan Company, Chicago, Illinois.
BUCYRUS MONIGHAN
Illustrated: Thompson & Starrett's 6-W Walker on the Colorado River Aqueduct and 5-W control tower.
281
BUCYRUS MONIGHAN
Sold by BUCYRUS-ERIE CO.
SOUTH MILWAUKEE, WISCONSIN, U.S.A.

Heavy-Duty Equipment Licks Hard Grading Job

John Oman, Jr., Fought Bad Rock, Bad Winter and Spring Floods on F.A.P. 285A in Indiana

(Photos on page 52)

THE 7.048-mile contract for grading and structures on Indiana Route 62 in the southern part of the state was a hard nut to crack. Rough virgin territory at the north end prevented bringing in the heavy equipment from that end, a stream divided the contract in the center and what was supposed to be limestone turned out to be sandstone and shale with a mere stratum of limestone at the bottom of the cuts.

A careful study of the job showed that the key to the work was the northern section, so John Oman, Jr., of Nashville, Tenn., who was awarded the contract for $206,286.75, moved in his drilling, excavating and hauling equipment to the northern section by barging it from Louisville up the Ohio River and unloading at Bull Creek Landing about 4 miles from the job.

Channel Change Tackled First

A separate contract was awarded for a steel truss bridge across 14-Mile Creek which bisected the job. Just north of this stream two small feeders met practically on the center line of the road, necessitating about 25,000 yards of excavation to move the channels so that the creek flowing in from the west would cross the right-of-way at right angles and then flow into the easterly creek. The suitable material from the channel change was used in a 100,000-yard approach fill for the bridge. The 25,000 yards of earth taken out were removed with two 12-yard LeTourneau Carryall scrapers pulled by Caterpillar diesel tractors. A 1½-yard Lorain shovel loaded to two Koehring Dumptors of 5-yard capacity and to two Linn 9-yard crawler trucks powered with Cummins diesel engines. This material was removed in 8 working days and the old channels which crossed and recrossed the road were kept open. The bottom 8 feet of the channel excavation was a soft blue material unsuitable for fill so it was wasted. This excavation was carried a maximum of 40 feet deep.

As the first material that went into the 100,000-yard approach fill was earth and the greater part of the material was to be rock it was necessary to load the toe of the slope to prevent squeezing as it reached its maximum height of 40 feet. The earth put into the toe was sloped 3 on 1 while the remainder of the fill was sloped 2 on 1.

Heavy Rock Cut

The approach fill required more material than was available in the first balance so rock as well as earth from the second balance was used. This carried an overhaul figure in the bid, an item that is usually not used in Indiana bids. The maximum haul for this case was 3,000 feet. The rock cut within the first balance had an overburden of 20 feet of earth which was removed in two lifts by a shovel. Then the 20 feet of rock was drilled, shot and excavated in two 10-foot lifts.

Compressed air for the wagon drills and jackhammers was furnished by two Davey 310-foot air-cooled compressors mounted on skids and powered with Caterpillar diesel engines, and one Chicago-Pneumatic 210-foot compressor powered with a Hercules engine. Three Cleveland wagon drills and nine I-R jackhammers did the drilling, using Timken detachable bits. The bits were discarded when worn.

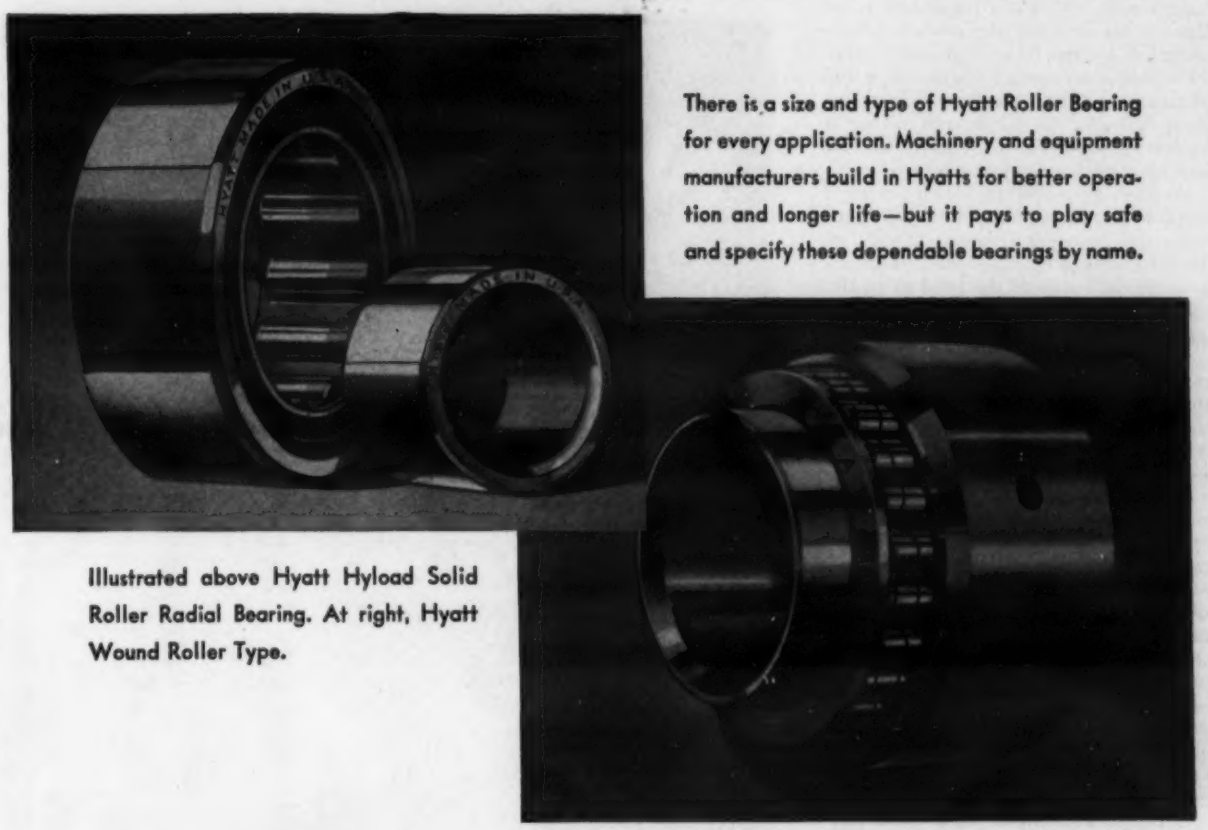
The ledge was of sandstone with seams of shale and at the very bottom some limestone. The wagon drill working on one section of this ledge put down 438 feet of hole in 420 minutes, changing the steel and the bits from 2½-inch maximum diameter down to 1⅛-inch.

The ledge was shot with Atlas 40 per cent gelatin dynamite, using electric blasting caps and an Atlas blasting machine. The rock was shattered so that what were apparently large blocks which would require redrilling and shooting simply broke up when lifted by the shovel. A Lorain diesel-powered 1½-yard shovel equipped with a manganese steel rock bucket loaded out the rock to three GMC 3-ton trucks, two Dumptors and two Linn crawler trucks. The shovel roughed in the slopes in earth sections as it progressed. In the rock ledge the stone was roughly a ½ to 1 slope but rather ragged because the material broke very irregularly. From the aesthetic standpoint it was far more

(Continued on page 33)

C. & E. M. Photo

A Koehring 1¾-Yard Diesel Shovel Loading Limestone to an Athey 14-Yard Wagon



There is a size and type of Hyatt Roller Bearing for every application. Machinery and equipment manufacturers build in Hyatts for better operation and longer life—but it pays to play safe and specify these dependable bearings by name.

Illustrated above Hyatt Hyload Solid Roller Radial Bearing. At right, Hyatt Wound Roller Type.

KEEPING *Several* STRIDES AHEAD...WITH

FROM the day anti-friction bearings were first applied, down through the years, each major development in machine design finds Hyatt out in front with improvements in bearing design, manufacture, performance. And, as time goes on, the basic Hyatt characteristics of greater precision, higher capacity, and smoother operation are constantly perfected. Not only has Hyatt kept pace in producing bearings to meet specifications, but many times has introduced application innovations. The ever-increasing use of Hyatt Roller Bearings, year after year, indicates how such diligence is richly rewarded. Hyatt Bearings Division, General Motors Corporation, P. O. Box 476, Newark, New Jersey.

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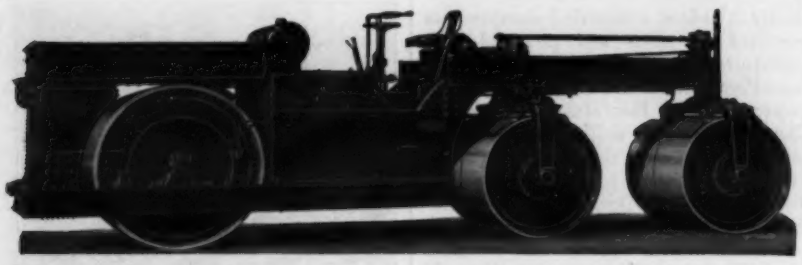


The 3-Axle 13 to 19-Ton Tandem Roller Which Buffalo-Springfield Reports Is Making a Record for Smoothness and Density in Rolling Bituminous Material. The Long Wheelbase, Large Diameter Rolls and Automatic Transfer of Weight Are Claimed to Result in Economy of Rolling Time Plus Surface Smoothness.

New 6-Cylinder Compressor Operates at Higher Speeds

The weight of the new Schramm Utility air compressor has been reduced as much as 50 per cent in certain sizes, according to Schramm, Inc., of West Chester, Pa., which exhibited both a trailer and a full size unit at the New Orleans Road Show.

The new compressor has six small cylinders instead of two, three or four large heavy cylinders and the modern piston material allows lighter moving parts. This means successful operation at the higher speed which has been stepped up from 800 rpm to 1,200 rpm giving a greater distribution of air impulses and less wear and greater engine efficiency.

Another new feature which serves a two-fold purpose is the positive mechanical valve to assure positive timing of the air entering the cylinders. This allows the full area of the head to be devoted to the discharge valves necessitating lower lift and less wear per impulse.

Special features of the new Schramm compressor include a sight gas gage and an easy starting clutch so that the engine may be started without the compressor load, and by an easy pull of the lever the compressor is engaged. Air-Maze air filters are used both on the compressor and engine intake, giving cleaner oil and greater life for the unit. The automatic air control has but one moving part which moves only a fraction of an inch to regulate the air delivery according to tank pressure. It operates in conjunction with the intake unloader cylinders and engine slow-down. The slow-down regulates the carburetor action according to air requirements. It is mounted directly on the carburetor with no parts or plungers and gives quick response and adjustment to idling speed, resulting in a saving of fuel. The fact that the unit is much lighter in weight and more compact makes it possible to mount Schramm Utility compressors on smaller truck bodies. A silent muffler eliminates noise and danger from flying sparks from the exhaust.

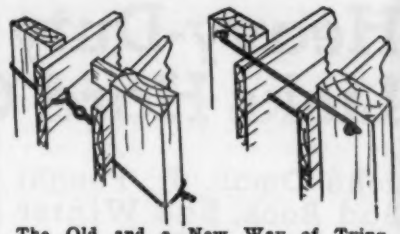
A complete tool box and tool rack is built into the truck chassis before the compressor is mounted; this includes large full-length tool boxes and a steel rack for an assortment of steel. The tool boxes will hold as many as 8 or 10 tools on each side of the truck with room for accessory equipment.

Complete information on this new 6-cylinder Utility air compressor may be secured direct from Schramm, Inc., West Chester, Pa., by mentioning this magazine.

New Wire and Nail Ties For Concrete Wall Forms

Common wire, formed into ties, has always been the most common method of tying concrete forms. Now Nail Ties are being offered at a very slight cost over the actual price of the wire used in the old method and in a form which saves on the labor cost of tying and eliminates the need for spreaders.

The Nail Ties, made by Jeschke Wire Specialty Works, Crawfordsville, Ind., are formed of No. 8 copper-content steel wire in five standard lengths, each of which is suitable for four or five different thicknesses of wall. The pointed ends are driven into the uprights and then nails are driven through the loops. In removing, it is necessary only to pull the nails. The loop and point will go through a ⅝-inch hole and the strong No. 8 wire serves as both tie and spreader.



The Old and a New Way of Tying Concrete Forms

The producer claims that there is an actual saving of 30 to 50 per cent in the labor cost of form building when using these ties and that they do away entirely with the cost of spreaders and the expensive operation of cutting, placing and removing them.

LAYING BLACK TOP?

JAEGER PAVER has 10 ADVANTAGES:

- 18 Ft. Movable Forms Give Smoothness of Concrete,
- 50% More Traction,
- No Load on New Material,
- Adjustable 9 to 14 Ft. Widths,
- Blends Perfect Joints,
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- Lays Hot or Cold Bituminous, Stone or Macadam,
- Pug Mill Spreader,
- Less Hand Finishing,
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NEW SMITH 28-S

it's faster!

A brand new compact machine, as modern as television, with the well known Smith dependability, plus many new, but tried and proven features that make for even greater speed and economy . . . New variable speed V-belt drive insuring equal efficiency on either dry or wet batches . . . Extra big diameter narrow drum for faster charging and discharging . . . Full-width renewable drum liners . . . Full-width buckets coated with unusually hard alloy metal for maximum protection and long life . . . Enclosed gear reduction unit running in oil . . . Enclosed power discharge direct connected to countershaft with worm and gear running in oil . . . New self-contained vertical syphon-type water tank . . . Three way, balanced piston-type valve . . . Oversize anti-friction bearings.

Write for new catalog just off the press.

THE T. L. SMITH COMPANY, 2857 North 32nd Street, Milwaukee, Wis.

SMITH MIXERS

THE BOULDER DAM MIXERS

County Laboratory Controls Road Work

(Continued from page 2)

maintenance are of a uniform quality and conform to our specifications, as well as other standard specifications. Its essential value lies in avoiding the use of defective materials but it is not to be assumed that the full value of the laboratory lies in the volume of tests nor in the quantity of rejections of materials. Neither is it intended to function primarily as a detective bureau for the discovery of defects in materials or construction after work has been completed. The laboratory functions as part of the engineering organization, but in cooperation with the other divisions. This is of material value especially in maintaining high strength and consistency of concrete through proper control of the mix. Another function of the laboratory is to design and control the proportioning of materials used in the various types of wearing surfaces as well as the methods of placing, mixing and curing the finished product.

Central Location

The laboratory is located at our branch shops in Wayne, Michigan, centrally situated so that there is a direct contact between the laboratory and the job at all times. Within an hour from the time a core or sample is taken on any particular job, the testing operations may be begun in our laboratory and the results known with the least possible delay.

Concrete Pavement Design Control

In the construction of concrete pavements, our specifications are quite rigid and it is the responsibility of the laboratory to see that all materials received conform to these specifications. The proportions of materials used in concrete mixtures are determined by the "Mortar Void" method and the compressive strength is determined by the "Water-Cement" ratio. The concrete is designed for a compressive strength of 4,000 pounds per square inch at 28 days, and it is gratifying to note that the practical results obtained verify the theoretical research by the laboratory. The test results on 400 cores drilled from pavements laid during the season of 1935 show an average compressive strength of 4,135 pounds per square inch in 28 days. This is due chiefly to the control of the mix by the laboratory.

Inasmuch as materials come from a great many sources, we do not have a standard mix to be used on all projects. The mix is designed in the laboratory based on the materials to be used on a particular project and are changed as frequently as the source of supply is changed or the properties of the materials change. Frequent samples of aggregates are taken either at the source of supply or at the delivery points and submitted to the laboratory. Very close and rigid inspections and screen tests are made of the grading of both coarse and fine aggregates to check the fineness modulus and the percentage of silt, and calorimetric tests are made to determine the presence of organic impurities. The design of the mix is altered whenever any change is detected in the fineness modulus of the incoming materials. Daily field tests are conducted to determine the moisture content of the aggregates and the weights to be used are thereby determined, using the designed mix as a basis. The slump to be maintained is controlled by the laboratory.

Field Control

As a field control and check on the theoretical designs, cylinders 6 inches in diameter and 12 inches high are molded daily on each project and slump tests are made several times during the day. This work is done by the inspector on the job under the direction of the laboratory. The cylinders are cured in the same manner as the pavement and then submitted to the laboratory for tests. Seven day compression tests are performed and when the required strength is not developed, changes in the mix are made, and the ultimate strength of the concrete positively controlled.

The Olsen Machine for Testing the Compressive Strength of Concrete

In addition to this, we have a core machine in operation throughout the entire construction season. This machine

(Continued on page 40)

CONCRETE VIBRATORS

Air operated vibrators for all classes of concrete construction including bridge deck slabs, dams and locks.

Portable Vibrating Screed Boards for highway pavements.

Special steam operated vibrators for placing hot asphalt mixtures.

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Austin-Western was one of the pioneers in the use of hydraulic controls for road building and earth moving machinery.

It maintains its leadership in this important field.

Austin-Western hydraulic controls are dependable and smooth-working under all conditions. They have brought about an enormous simplification because they have approximately 75 to 85% fewer moving parts than mechanical controls and a corresponding reduction in opportunity for wear and breakage.

Open an Austin-Western control valve and you get instant, powerful response. Close it and the adjustment is locked as in a vise.

No other control equals it for accuracy of adjustment.

Austin-Western incorporates these controls wherever needed on its machines.

They are one of the plus features which you receive when you buy an Austin-Western.

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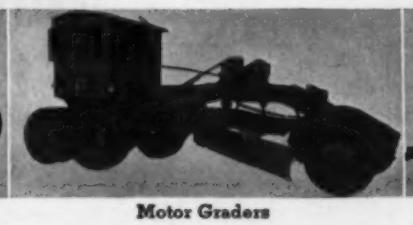
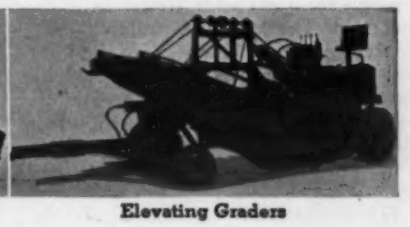


Motor Graders



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Austin-Western

New Devices Feature of Illinois Paving Job

(Continued from page 9)

template which rolled on the forms. Where low spots were indicated dirt was shoveled in and hand-tamped by a man used solely for this work. The forms were all hand-tamped as soon as set and again where it was necessary to realign them after the Finegrader had passed over.

As the paver runs outside the forms in Illinois, the grade was left clear for the setting of the center steel and the expansion and contraction joints. On this contract all the accessories for the Ace expansion and contraction joints and the center steel were carried on a pneumatic-tired rig which was handy and moved easily. A pleasant surprise for the inspector and for the workmen placing the V-shaped forms for the key between the two 20-foot slabs was a device brought out one morning by Roy Blackwell, the result of an idea that popped into his mind the day before, a simple holder for the key forms.

It consisted of nothing more than a horseshoe-shaped holder made of a heavy iron bar with a lever or clamp attached to one side. When it was slipped over the form the slight crook in the end of the bar fitted under the V in the key form and then the lever was pushed down, holding the form snug against the road form.

There were three men setting the Ace joints and the center steel, one man oiling the forms and the dowels, and two men assembling the joints. The center strip for this contract was 7½ inches high and was set ½ inch low in the 8-inch slab. The center steel used on this work was the new slotted type which provides a greater bond for the concrete but at the same time furnishes the desired plane of weakness. The center steel was set to line with an angle-iron gage and was then supported by pins driven at 2-foot intervals on both sides of the steel.

The dowels through the center strip were set every 30 inches and were 30 inches long and of ½-inch round deformed steel held horizontal by sheet metal chairs.

Contraction and Expansion Joints

The contraction joints consist of one piece of sheet metal running the full width of the pavement and fitting the 1-foot thickened edge. The bottom of the metal is bent to form a base 1¾ inches wide. This metal carries a continuous copper seal on top wih a stiffening bead on the outer edge and slotted to give a better bond with the concrete. Two-foot dowels of ¾-inch diameter are inserted through the joint with 18 across a 20-foot strip. The dowels are tied to ½-inch transverse bars on both sides of the joint and alternate dowels are supported by sheet metal chairs. The ends of alternate dowels on both sides are oiled. There are also diagonal wire supports under the joint to hold each dowel horizontal.

The expansion joints are similar in construction, with the exception that there is a 1-inch air space running through the entire width of the joint to provide for the expansion of the concrete. The ends of the air space are sealed by a cap of premoulded expansion joint material and a copper seal, except where the joint will open into a gutter section where the cap is omitted, but the outside end of the gutter extension is sealed in a similar manner, using the cap.

A premoulded block of bituminous material is wired to the top of the expansion joint and is slotted to fit on the top of the copper seal. While the contraction joint is set ½ inch low, the expansion joint is set but ¼ inch low and is edged while the contraction joint is not. The dowels for the expansion joint are the same as for the contraction joints, except that they have metal sleeves on alternate ends, half heading toward the paver and the other half heading away. The sleeves are 5 inches long and crimped so that they will slide on for 3 inches only. The ends are tightly crimped to prevent the entrance of grout.

Making Up the Batches

The crushed limestone used as coarse aggregate was furnished by the East St. Louis Stone Co. and the sand by the Illinois Materials Co. while the cement came from the Alpha Portland Cement Co. The stone was unloaded from the hopper bottom cars into a pit and then loaded to the bins of the Erie AggreMeter by the Speedcrane and 1-yard Hayward clamshell. The sand was unloaded directly from the gondola cars to the bins or stockpile.

The batching set-up was unusual in that the batcher man stood on the ground just below the bins and the scales were at that elevation. They were double scales controlled by a lever so that when the rock was being weighed the lever was thrown to the top position and when the sand was weighed the lever was thrown to the bottom position and the balance pointer again brought to the neutral position to balance. The batches were made up with 1,492 pounds of sand, 2,170 pounds of crushed limestone, 6⅓ bags of cement and 29.35 gallons of water.

After the aggregate was batched to the 2 and 4-batch trucks they pulled to the cement car where three men loaded six bags of cement onto each batch. Then they pulled ahead a few feet and another man who weighed out the cement into 31 1/3 pound lots from a mortar pan tossed the partially filled bags onto the batches to complete the cement content.

The hauling fleet consisted of five 4-batch Ford trucks, one 3-batch Ford, two 2-batch Ford trucks and two 2-batch Indiana trucks. With the organization and the hauling fleet described above the contractor made 1,200 feet of 20-foot slab in 12 hours, using two 6-hour shifts.

Paving

The batch trucks, having stopped en route to have the 6 1/3 bags of cement

(Continued on page 45)

CONTROLLED IGNITION
BRINGS A *New Era* OF TRACTOR ECONOMY AND SATISFACTION . . .

Repeat orders are the best testimonials! When the Controlled Ignition Oil Tractor was introduced—it answered what engineers had called the greatest tractor need of the day—the economy of Diesel fuel oil COMBINED with the flexibility, instant starting, balance, reliability and all-round performance of gasoline models. Probably the best evidence that Controlled Ignition met a real need is the expression of Oil Tractor owners—with repeat orders. The first contractor owner of Oil Tractors has since standardized on A-C Controlled Ignition. So has the first county purchaser of Controlled Ignition. And so have hundreds of other Allis-Chalmers owners everywhere. There's a reason for this expression of user satisfaction. Let the A-C dealer show you.
Allis-Chalmers Manufacturing Co., Tractor Division, Milwaukee, U. S. A.

Controlled Ignition

South American Countries Show Interest in U. S. Roads

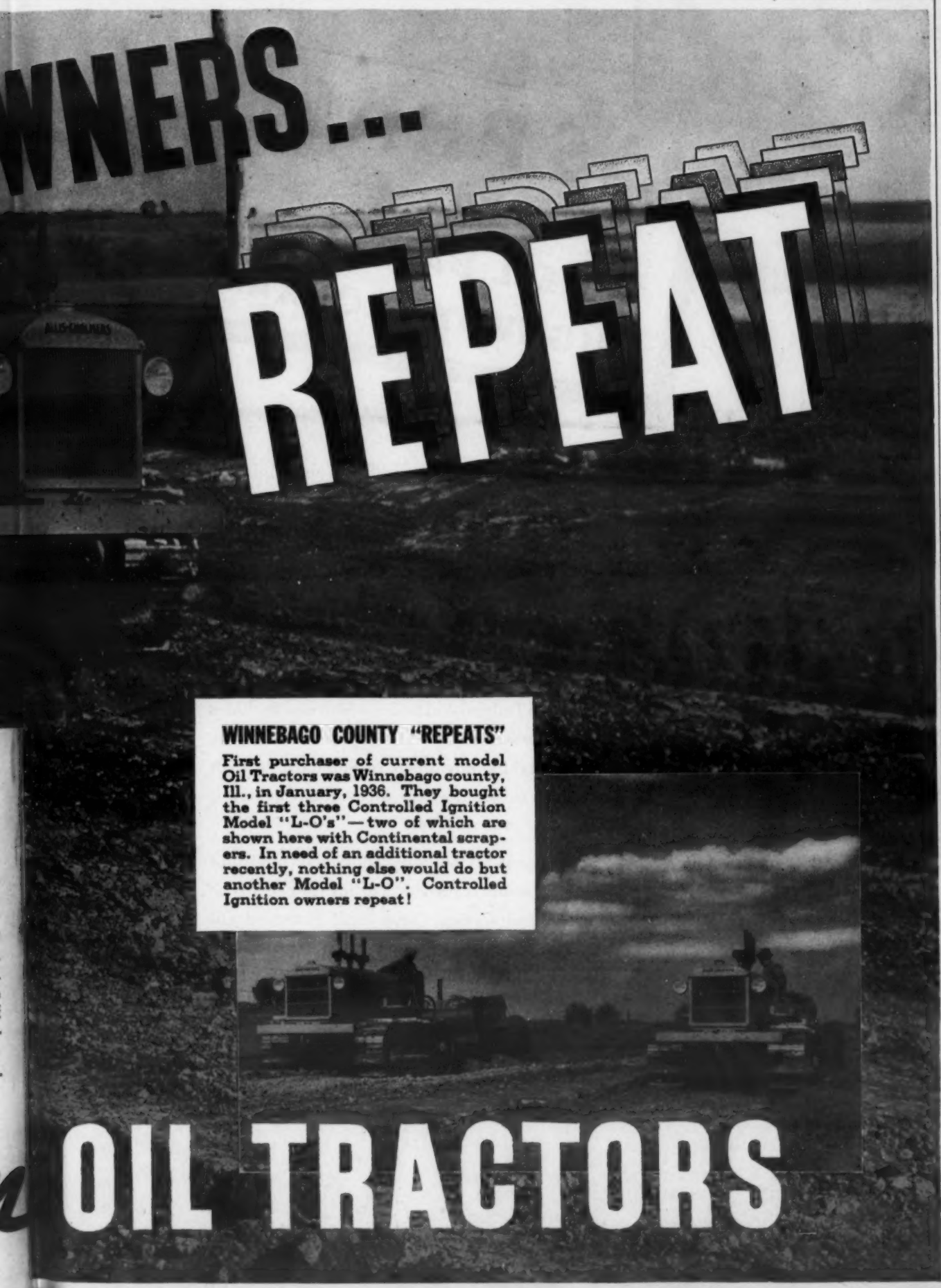
President Roosevelt's trip to South America has been credited by the American Road Builders' Association with having influenced the record-breaking number of registrations from Latin-American countries for the ARBA Convention and Highway Exhibit held in New Orleans January 11-15.

The large number of delegations attending these conventions has resulted in the Association's Pan-American session being so well-attended. This year unprecedented interest was shown by South American officials and engineers in the current road-building program in the United States after the President's visit to South America. The Association also received many inquiries regarding construction progress on the Pan-American Highway which has been completed from Laredo to Mexico City and which ultimately will provide direct motor vehicle travel between North, Central and South America.

A large percentage of the equipment used in the construction of this highway was manufactured in the United States.

In addition to the delegations from Central and South America, the ARBA Convention was attended by highway officials from Canada, England and numerous other countries. W. Rees Jeffreys, of London, Chairman of the Roads Improvement Association for England and Wales, attended as honorary representative of the Association's European Division. En route he stopped in Washington to confer with officials of the American Road Builders' Association and the U. S. Bureau of Public Roads.

Over 6,000 miles of roads are under construction and repair in Bulgaria since the appropriation of $8,700,000 for that purpose was made available last year. In August more than 8,500 men of the Compulsory Labor Service and over 3,000 unemployed were engaged in this work. The most active work is on the Bulgarian section of the international route connecting western Europe with Istanbul, Turkey. Other roads on which work is active are those leading from Sofia to various important sections of the country.


WNERS...
REPEAT
OIL TRACTORS
WINNEBAGO COUNTY "REPEATS"
First purchaser of current model Oil Tractors was Winnebago county, Ill., in January, 1936. They bought the first three Controlled Ignition Model "L-O's"—two of which are shown here with Continental scrapers. In need of an additional tractor recently, nothing else would do but another Model "L-O". Controlled Ignition owners repeat!

Highway Lighting Discussed by Engr.

(Continued from page 14)

approach those conditions with proper precaution and at a speed at which he can size up the problem ahead properly and make a safe decision.

Economical Solutions Necessary

An important principle of good traffic engineering is that that solution of a high-accident problem should be adopted which most economically provides the required type of protection against accidents. This is forced by limited budgets for highway protection. It makes it necessary to avoid excessive use of any one type of protection. It means that at one point a certain type of sign may be necessary, at another a stop-and-go signal, at still another a well-marked center line, at a fourth a section of special lighting, and so on, each of them applied to the type of location to which it is especially adapted and none of them carried to excess. Recognizing that principle, highway and traffic officials have been extremely cautious—perhaps too cautious at some points—about the installation of highway lighting equipment.

Where Lighting Fits

That condition can be overcome only by defining very carefully to these officials where highway lighting is necessary for safety and furnishing them with the type of analytical procedure which will demonstrate beyond question the need for highway lighting at those places where it is needed. It would be futile, for example, to install lighting for safety along a stretch of highway that had had no night accidents. It would be equally futile, but perhaps not so apparently so, to install highway lighting along a section of highway which had had night accidents of a type which highway lighting could not materially lessen.

The lighting of rural highways must be applied at those points where the accident experience shows that accidents of a type which highway lighting can prevent are occurring and application of lighting to those points must be very carefully made. The object of the lighting must be to reveal clearly to the approaching driver conditions which he must recognize for safety in driving, and which would not otherwise be revealed to him. Such installations will demonstrate their value, not in moderate percentages of reduction of accidents, but in percentages closely approaching 100. Such reductions are conclusive.

Various demonstration sections of lighting have been installed or proposed. If these installations have not been made where accidents of a type which such lighting installations can prevent have been common, the demonstrations will be futile so far as accident prevention is concerned. My advice to the highway lighting industry is that these installations be made only where serious accident hazards exist and where an analysis of the night-accident experience shows that lighting will reveal the hazards as nothing else has done. There is no argument for any type of highway improvement which is now more powerful than the proof that it will prevent accidents and that the prevention of these accidents is a major requirement in the successful use of the highway. However, such an argument which is not based upon accident experience which can be shown is futile.

Proving Lighting Value

When an installation is made at such a place, the accident experience should be spotted upon a collision diagram showing the section of highway which is lighted, the directions from which vehicles approach the points where the ac-

(Continued on page 34)

A New Wagon Crane On Rubber Tires

The latest addition to crane equipment is the Browning Mobile Wagon Crane mounted on pneumatic tires with puncture proof tubes or on solid rubber tires. This crane can move over ground, drives and walks which would be marred by metal crawlers. Under its own power it travels from 2 to 6 miles per hour yet can be hauled behind a truck at greater speed.

The Wagon Crane is powered with a gasoline, diesel or oil-power engine and is handled by the operator without leaving his seat whether traveling, steering or operating it as a stationary crane. With a 20-foot boom, the crane will swing 12,000 pounds at a 10-foot radius without outriggers or 6,500 pounds at 20 feet. With its maximum boom 40 feet in length, it will handle 9,200 pounds at 12-foot radius without outriggers or 11,800 pounds with outriggers, and 1,600 pounds at a 40-foot radius without outriggers. This crane is made by The Browning Crane & Shovel Co., 16226 Waterloo Rd., Cleveland, O.

New Section of U. S. 1 Has Safety Lighting

More than 6 miles of the Boston Post Road, U. S. 1, in Connecticut from the New York State line through Greenwich and Cos Cob to the Stamford town line will soon be illuminated with 125 10,000-lumen incandescent and sodium lights. The Connecticut Light & Power Co. has announced that this portion of the heavily-traveled four-lane highway will be the first and longest stretch of illuminated safety highway in Connecticut.

Sodium and incandescent safety luminaires, developed by General Electric engineers, will furnish the illumination for the system. These luminaires will be equipped with special reflectors and refractors which will more than double the amount of light thrown on the street by old-style units, while directing the light away from residences in Greenwich and Cos Cob.

ASPHALT
FOR A
WELL BALANCED
HIGHWAY PROGRAM

FARSIGHTED highway officials and engineers are recognizing the importance of well balanced highway systems with a planned program of development that not only includes primary or arterial highway construction, but lays equal stress on adequate, more lasting and convenient farm-to-market or secondary roads.

Many are taking advantage of the recent change in Federal Aid policy which now includes grants for secondary road improvement. They are also taking advantage of Standard Asphalt products to get more for their money in faster, safer, low cost surfaces.

Standard Oil Company (Indiana) asphalt and road oil products provide a grade for every type of mix and service. Your local Standard Oil representative can give you full information on standardized methods of construction to help you get the most satisfactory highway miles at lowest maintenance cost from your road fund.

Copr. 1937, Standard Oil Co.

Asphalt for every purpose STANDARD OIL COMPANY (INDIANA)

Mounds of Rubbish Moved for Fair Site

Johnson-Necaro Company Has $2,000,000 Grading Contract To Move 7,500,000 Yards of Dirt on Flushing Meadows, N. Y.

MOVING New York City's accumulated rubbish from its dumping ground in Flushing, Long Island, to make way for the 1939 World's Fair, turned out to be the biggest material moving job ever attempted east of the Mississippi River. This $2,186,000 contract was awarded to the Arthur A. Johnson Co. and the Necaro Co., who offered a joint bid for the job, and who between them have been responsible for $200,000,000 in subway, tunnel and general construction work in Metropolitan New York.

The contract called for the leveling of the 1,200-acre area, the elimination of the mile-long 100-foot wide Flushing River, top-dressing the area by dredging from the river channel, the demolition and removal of 336 buildings, and the construction of a lagoon system, all to be completed in ten months' time, by April 1, 1937. One of the biggest problems is the formation of a new waterway, consisting of two large lakes, one a mile and the other a half mile in length, both more than one-fourth of a mile wide, and a chain of miniature lakes connecting these with Flushing Bay. The 16-foot channel of the river is tide-water; the lagoon system will be spring-fed fresh water, maintained through the operation of a tide control dam.

Work Starts with a Bang

The contract was awarded on June 9, 1936 and work began at high speed the following day. Eight hundred men and $750,000 worth of heavy equipment have since transformed the ancient meadows and dump heaps into a scene humming with the activity of the proverbial beehive.

The unusual character of the contract puts an exceptional burden on the contractors' equipment which is handling the vast yardage of material. Because of the swampy, insecure footing, the contract stipulates that all loads of the heavy dump units be placed 50 feet back of the fill, necessitating much rehandling of every load by the fleet of nine International tractors equipped with bulldozers.

As the powerful shovels and draglines cut deep caverns in the mountains of rubbish, some of them 90 feet high, festoons of ancient bed springs, auto bodies, stoves and "tin lizzies" are unearthed, presenting a most unusual excavation scene.

Preparation—A Joint Effort

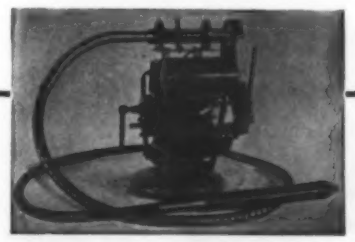
Although the New York World's Fair of 1939 is nominally the effort of a private corporation, much is being contributed by the City, State and Federal Governments toward its success. The first contribution of the City was to provide some protection through zoning against the use of adjacent property for advertising signs and devices in order to insure the beauty of the Fair grounds and approaches. A study of the subject was made and it was soon apparent that there were other things than advertising to be controlled if the Fair was to be what its originators wish to make it. It was recalled that the Ringling Brothers Circus set itself up near the main gate during the recent Chicago Fair, and the fact was recognized that side shows and cabarets of all kind were to be found outside the grounds of most so-called World's Fairs, and in fact of most State or County Fairs. These detract from the fair itself financially and affect the question of safety and convenience of traffic and the appearance of the approaches.

The City of New York and its people have a real interest in the 1939 World's Fair. They have a financial interest because they are spending over $12,000,000 directly chargeable to the Fair, to prepare the grounds and to house a municipal exhibit, and because all surplus monies owned by the Fair Corporation after its bonds and debts have been paid, up to $2,000,000, will be used to embellish the fair grounds as a permanent municipal park, and one-half of all monies over that amount will be given to City charities. For these reasons definite steps are being taken toward the proper zoning of the area surrounding the World's Fair site.

The State has an interest because the City is a part of the State and the State is spending large amounts for an exhibit, as well as over $4,000,000 for highway improvements and grade sep-

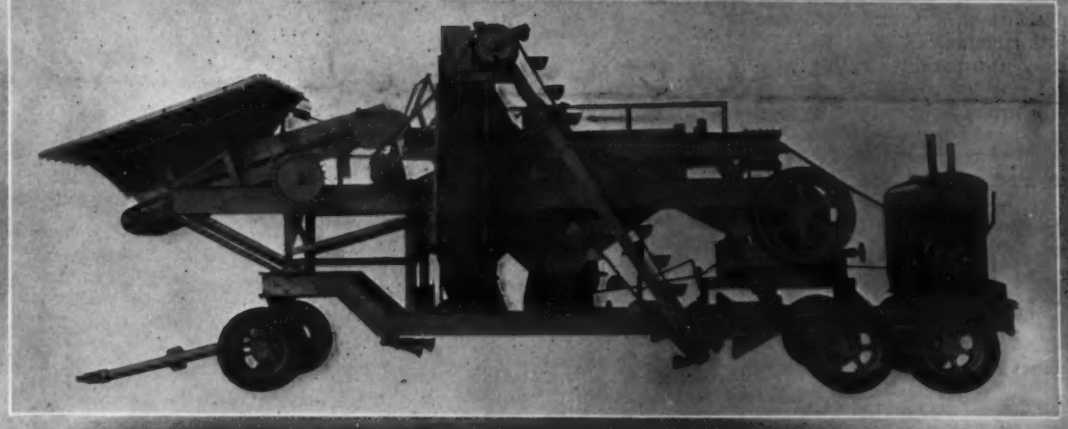
(Continued on page 42)

Mountains of New York's Rubbish Are Being Moved to Make Way for the World's Fair in 1939

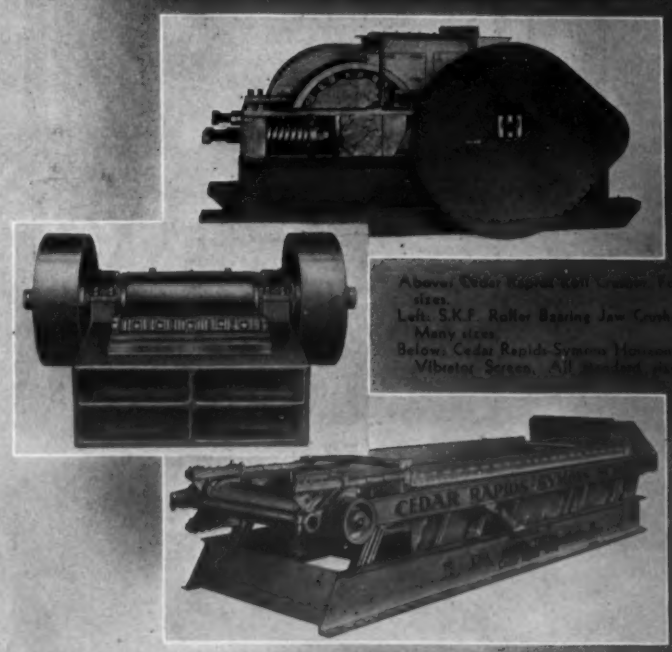


Concrete VIBRATORS
AND GRINDERS
Write for Circular on types, sizes and prices
White Mfg. Co.
ELKHART INDIANA

THE 1937 CEDAR RAPIDS PROFIT MAKERS



Heading the list of Cedar Rapids Profitmakers for 1937 are the Straight Line Portable Rock and Gravel Plants. The Super Tandem Type is shown in the upper right hand picture. The Junior Tandem Type is shown immediately above.



Above: Cedar Rapids Roll Crusher. Four sizes.
Left: S.K.F. Roller Bearing Jaw Crusher. Many sizes.
Below: Cedar Rapids-Symons Horizontal Vibrator Screen. All standard sizes.

Other Iowa Profitmakers

Asphalt Mixing Plants (Hot or Cold Mix)

Traveling Road Mix and Rapidmix Plants

Portable Quarry Plants

Washing Plants

Tractor-Crusher Roadside Plants

Belt Conveyors — Screens — Bins — Bucket Elevators

Portable Placer Machines

Gravel Stabilizer Plants

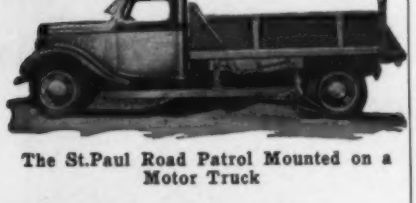
A Complete Line of Portable and Stationary Material Handling Equipment

These are the Profitmakers for 1937

CHANGE TO IOWA & FOR PROFIT &

Cedar Rapids Portable Rock and Gravel Plants lead the field because they make greater profits for their operators. They are Profitmakers because they give greater capacity at lower operating costs. Change to Iowa for Profits. Write for bulletins.

IOWA MANUFACTURING COMPANY
CEDAR RAPIDS, IOWA, U. S. A.



The St.Paul Road Patrol Mounted on a Motor Truck

A New Road Patrol For Truck Mounting

The new St.Paul hydraulic truck patrol is a low-cost high-speed one-man-operated all-year-round maintainer that fits any truck with a wheelbase of 140 inches or over, and reshapes and smooths the surface of rough roads, according to the manufacturer, the St.Paul Hydraulic Hoist Co., Minneapolis, Minn.

This undertruck device is designed as a cutting and levelling mechanism, not just a scraper. It is also adaptable for cutting road shoulders for it can be adjusted to cut thin for easy disposal of sod, or take a deep cut if required.

The hydraulic truck patrol blade may be operated at any angle up to 45 degrees, and reversed to cut either way. Because of this angle and correct cutting position of the moldboard, it will move material the full length of the cut to the other end of the blade. Adjustments and control of the blade are simple and easy. Two levers in the truck cab operate the valves for the hydraulic rams which raise and lower each end of the moldboard.

A feature of this device is the St.Paul levelizer which exerts pressure up against the down pressure of the hydraulic rams to hold the blade in required cutting position without rigidity, yet with sufficient strength to insure proper cutting action.

Complete information on this new road patrol may be secured direct from the manufacturer by mentioning this magazine.

Dresser Promotions

S. R. Dresser Mfg. Co., Bradford, Pa., manfacturer of flexible pipe couplings and pipe-line repair devices, has announced the promotion of M. N. Davis from Vice-President in Charge of Sales to Executive Vice-President. Mr. Davis also continues as Secretary of the company.

H. P. Boncher, formerly Assistant Sales Manager, is now Sales Manager. R. E. Reimer has been made Assistant General Manager in addition to his duties as Treasurer. H. N. Mallon continues as President and General Manager, and F. A. Miller is Chairman of the Board.

A New ¾-Yard Shovel

The new Model 25 ¾-yard fully-convertible shovel, just announced by the Northwest Engineering Co., 1730 Steger Bldg., 28 E. Jackson Blvd., Chicago, Ill., is similar in design to the recently announced Northwest Models 15 and 18 but is larger and heavier throughout, with speed as its outstanding feature.

The base is of cast steel, the side frames being cast integral with the rotating base. Travel gears are fully enclosed. The feather-touch control, for easy operation, and the cushion clutch which limits the hoist rope pull to a definite value are standard equipment. The swinging clutches, of the cone type, are smooth-acting, non-grabbing and cool running. All high-speed shafts are mounted on ball or roller bearings, and the power take-off is through helical gears running in oil in an oil-tight housing. A full cab is standard equipment, and all operating parts above the deck are accessible within the cab.

Power is furnished by a 6-cylinder Wisconsin gasoline engine, and electric or diesel power is also available. As a shovel, the unit is equipped with a welded boom and dipper stick with a ¾-yard manganese steel dipper.

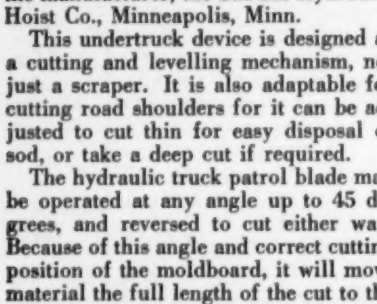
Mall TRADE MARK

BUILDS THE COMPLETE LINE!

Concrete Vibrators for every type and size of job—electric motor, gas engine, and air driven units for placing dry mixes of low slump concrete in walls, dams, bridges, pavements, and culverts. Attachments available for concrete surfacing, drilling, grinding, pumping, and sawing.

Furnish us with full particulars and we will gladly recommend and quote prices on the unit best suited for your work.

MALL TOOL COMPANY
7743 South Chicago Avenue
CHICAGO, ILLINOIS
OFFICES IN ALL PRINCIPAL CITIES
Illustrated: MALL portable gas engine unit placing concrete on thin wall sections.



20' Back-up Spread, ½" chips
KOB Disc Spreader
patented 1929

Spreads sand, gravel, chips, shale, cinders, or chloride.

Fits any dump truck, large or small.

Makes icy hills and curves safe.

See your local dealer or write us for further information

KOB MFG. CO.
329 E. Brown St., Milwaukee, Wis.

Experience says.. buy BLAW-KNOX

● Experienced contractors know Blaw-Knox ability to design, build and deliver time and labor saving road building equipment . . . a confidence expressed by repeated dealings over a period of thirty years.

Time and again the decision to "ask Blaw-Knox" has resulted in the practical answer to a particular job problem.

Blaw-Knox constantly extends its broad engineering experience and resources to the aid of the road builder.

BLAW-KNOX COMPANY
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also: WEIGHING BATCHERS for Aggregates and Cement . . . CENTRAL MIXING PLANTS . . . TRUCK MIXER LOADING PLANTS . . . STEEL FORMS for General Concrete Construction . . . CONCRETE BUCKETS . . . BOTTOMLESS SCRAPERS . . . SHEEPSFOOT TAMPING ROLLERS

CLAMSHELL BUCKETS TRUCK MIXERS BULK CEMENT PLANTS

Big Draglines Used To Enlarge Barge Canal

(Continued from page 2)

in July, 121,000 cubic yards, in spite of the fact that it had to cross a creek during the month, causing a delay of almost two shifts. On the Monighan was an operator, engine man and laborer for each shift. The contractor also had one civil engineer and two civil engineer helpers during the day shift.

In order to insure prompt repairs a Westinghouse electric welder was kept on the berm close by the Monighan.

According to the contract and specifications for these two sections, the contractor is expected to excavate 2 feet of material from the bed of the canal but he is paid for as much as 3 feet of excavation if the daily cross sections of the engineers show that this amount of material has been removed. These cross sections are made by a drag sweep before the contractor's equipment has moved ahead so as to permit him to correct any sections where the excavation is too shallow.

Personnel

Leigh D. Cairns was Superintendent for Morrison-Knudsen Co., Inc., on Contract No. 4 and T. G. Rivers was Superintendent for W. E. Callahan Construction Co. on Contract No. 8. These contracts were awarded by the State of New York and are being financed by the Federal Government. The work was performed under the general direction of the Corps of Engineers, U. S. A., Albany Office, First District, with Captain J. C. Marshall, Assistant in Charge. For the State of New York, the work was directed by L. D. Brownell, District Engineer, New York State Department of Public Works, Second District, with William Robinson, Associate Engineer in charge of canal work for the District, H. W. Jewell, Resident Engineer on Contract No. 4, and R. D. Cameron as Resident Engineer on Contract No. 8.

New White Trucks In Larger Volume

White Motor Co., Cleveland, Ohio, has entered the low-price truck field with a new line priced at less than $1,000. Manufacture of the new truck model will push the production schedules upward 50 per cent over last year. White anticipates the sale of more than 20,000 units during the coming year. First of the new series, orders for which have already topped the 500 mark, rolled off the assembly line early in January. The new truck rated in the 1 to 1½-ton field will be manufactured in two models, 700 and 700K, the latter a wheeled tractor. This new series will make available a group of optional features such as wheelbases, transmissions, rear axle ratios and tire sizes to meet the requirements of specific operations.

Single Wheel Rollers Equipped With Power

The Wheeled Roller has been accepted by many maintenance departments of states and counties as a handy device for rolling patches. Its two rubber-tired wheels permit rapid towing behind maintenance trucks and when it reaches the site of the patching it is unhitched from the truck, the tongue turned over, lifting the wheels from the ground and placing the roller in contact with the ground surface.

The Wheeled Roller Corp., San Antonio, Texas, has now announced a power-driven wheeled roller known as No. 135. This motorized wheeled roller is trailed to the job as was the old one and when on the job the tongue is lifted up and over as before, placing the roller in contact with the ground. A subframe remaining in a stationary position carries a 5-hp air-cooled gasoline engine which furnishes power for the roller. One man takes the tongue and guides it back and forth over the areas to be rolled. This roller has forward and reverse at the same speeds, these being from 1 to 2½ miles per hour. It applies a pressure of 135 pounds per square inch of contact with the ground surface.

The design permits the removal of the transporting wheels and the spindles by loosening one bolt when it is necessary to roll in close quarters such as up against walls or curves. This is not necessary on highways or open street patching but this feature makes this roller available for work in rolling paths on estates or parks, thus opening a new field of activity for smaller contractors who heretofore have been forced to use some form of hand roller for this type of work.

The New Powered Wheeled Roller on Maintenance Work

SIMPLE
RUGGED
DEPENDABLE
SELF PRIMING PUMPS
STERLING QUALITY
UNIT CONSTRUCTION
Compact unit construction was pioneered and developed by Sterling to assure permanent alignment between pump and engine and to make the units readily portable.
Built especially for use on construction work, Sterling pumps are used and highly recommended by contractors everywhere.
Ask for complete literature today
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MACHINERY CORPORATION

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HEAVY DUTY
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More than 100 large illustrations are contained in this new Koehring Pictorial presentation. This book was prepared for you — for your reference file. It presents the application of equipment to all types of construction activity. Write for your copy today. Use the coupon—no obligation.
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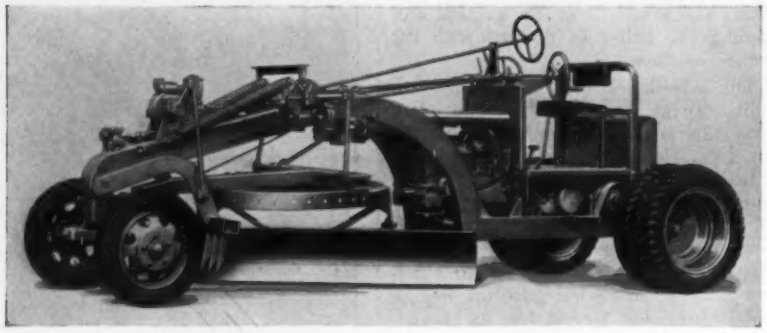


The New Adams No. 20 Motor Grader

Low-Priced Motor Grader With Special Heavy Drive

A new Adams motor grader No. 20, powered by an International I-12 tractor with a 22½-hp engine, has been announced by J. D. Adams Co., Indianapolis, Ind. This machine is expected to serve municipalities, towns and counties where heretofore it has been thought impracticable both from a work standpoint and financially to justify the purchase of a larger motor grader. It may be used for maintaining unimproved streets and alleys, for grading and maintaining roads and runways in parks, golf courses and airports as well as on township and light county maintenance.

The manufacturer states that a special heavy-duty one-piece rear axle is provided, driven by two large roller chains from the tractor axle. This chain drive between the tractor axle and the driven axle effects a speed reduction which increases the pulling power of the tractor 65 per cent. There are three working speeds of 2, 3.5 and 6 mph which are variable by foot and hand throttles. A speed of 7.5 mph is possible when the machine is traveling empty.

The narrow all-welded frame is of the box type, providing strength and rigidity and giving the operator an unobstructed view of the blade. Machine-finished ball and socket connections and a machined full circle allow close fits with adjustments for wear, eliminating lost motion and blade chatter.

Two hand-wheels within convenient reach of the operator raise and lower the blade. A simple gear transmission allows the right-hand wheel to operate the scarifier if the machine is so equipped. The side-shift of the blade is accomplished by a hand crank on the left side of the machine which operates a sliding bracket and side-shift link. The crank may be locked in any position by a hinged fork.

Standard equipment on this new machine includes a 9-foot blade and the approximate weight of the machine is 8,300 pounds. Optional equipment includes 10 and 12-foot blades, scarifier, canopy top, enclosure, starting and lighting equipment and other accessories.

Caterpillar Announces Central Sales Division

Caterpillar Tractor Co. has announced the appointment of Louis B. Neumiller as Sales Manager of its Central Sales Division. Edward W. Jackson has been made General Service Manager, the position formerly held by Mr. Neumiller.

The Central Sales Division is a sales area created by the division of the United States into three sales areas instead of the former two. It includes roughly the territory lying between the Rocky Mountains and the Mississippi River.

H. M. Hale is Sales Manager of the Eastern Sales Division, and H. H. Chambers of the Western Sales Division and F. G. Nunnelly of Canada. All of these men make their headquarters in Peoria, except Mr. Chambers, whose headquarters are at San Leandro, Calif.

Welding Pipe Lines

An improved welding method used in the construction of over 5,000 miles of cross-country pipe lines is discussed in a 32-page illustrated booklet published by The Linde Air Products Co., 205 East 42nd Street, New York City. "Lindewelding Pipe Lines," the title of this 8½ x 11-inch booklet, discusses the economy and rapidity of construction by this method, joint design, quality and strength of welds and the simplicity of field operations.

Other subjects covered are the growth of pipe line welding since 1914, time and material records on typical welded lines, construction organization and methods, welding specifications, welding rod and technique, metallurgical considerations, multi-flame welding, and the all-bell-hole method. A list of oxy-acetylene welded lines laid since 1917 includes many well-known oil, gas and gasoline pipe lines.

REX SPEED PRIME PUMPS...

MOST GALLONS PER DOLLAR!

THE CONTRACTOR'S GREATEST WATER MOVER

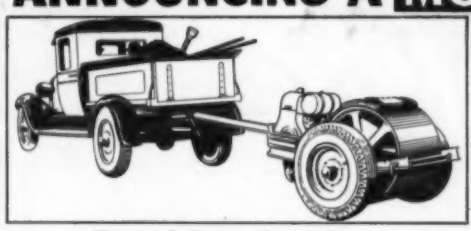
The new Speed Prime Pumps have everything that makes for economical and dependable water-moving—Greatest air-handling capacity—Completely automatic Prime Control—The Only Positive Recirculation Cut-off . . . . There are sizes to meet the needs of any job—no matter what the gallonage—from the little 2"-7M to the husky 8"-125M . . . They make dewatering jobs real money-makers. . .

Send for the new Pump Bulletin!

CHAIN BELT COMPANY
1556 West Bruce Street, Milwaukee, Wisconsin

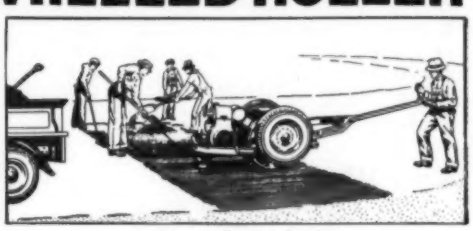
REX CHAIN BELT COMPANY OF MILWAUKEE CONSTRUCTION EQUIPMENT

ANNOUNCING A MOTORIZED WHEELED ROLLER



To and from the Job a High-speed Trailer

MODEL 135
COMPRESSION 135 LBS. PER INCH OF CONTACT
The most economical and efficient Roller for all types of patch work and miscellaneous small jobs.
Write for DETAILS!



On the Job a Self Propelled Roller.

The WHEELED ROLLER Corp. ★ SAN ANTONIO, TEXAS

fast!

"FOR HIGH SPEED WORK, GIVE ME A MICHIGAN!"

I've run lots of shovels in my time and I know what a real day's work with the ordinary type means, too! That's why I'm strong for the MICHIGAN . . . For several years now, the boss has bought MICHIGAN Truck Shovels for the high speed jobs. He knows that Michigan's AIR CONTROLLED CLUTCHES are faster, and they keep his operators at top efficiency without fatigue ALL DAY . . . Fingertip Air Controls are not new with the MICHIGAN. Their dependability has already been proved by *seven years* of actual use.

AIR CONTROLS are but ONE feature—Write for the MICHIGAN DATA BOOKLET "C" today

MICHIGAN TRUCK SHOVEL—3/8 yard capacity—25 m.p.h. road speed.

MICHIGAN POWER SHOVEL CO.
MILLER ROAD
BENTON HARBOR MICH.

CONTRACTORS' TAX SAVINGS

Here is the first complete discussion of legally permissible tax-saving methods, covering all Federal, state and local taxes, which makes plain to contractors and sub-contractors how to conduct negotiations and operations in order to escape avoidable tax burdens. Numerous examples are presented, enabling the reader to find a precedent for the problem at hand. An oversight of one of the numerous tax saving procedures described in the book might result in a very substantial amount of avoidable expense.

PLANNING FOR TAX ECONOMY

is a reservoir of practical experiences in approved tax-saving methods. The authors, William H. Crow and Urban S. Greene, an attorney and an accountant, with backgrounds covering over 20 years of professional specialization in tax matters, have assisted in solving numerous tax problems confronting highway contractors and those engaged in heavy construction. Supplements covering tax savings in respect to Federal Income and Social Security and the State Payroll Acts will be published from time to time and furnished to purchasers of this book at a nominal price.

Sent on Approval

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565 Fifth Avenue, New York, N. Y.

Without cost or obligation, you may forward a copy of PLANNING FOR TAX ECONOMY by Crow and Greene. Cost, if we keep it, $7.50; otherwise we may return it within five days without further obligation.

Name _____
Firm _____
Address _____

Grading Job Licked With Heavy Equipment

(Continued from page 23)

attractive than the neatly dressed slopes of an earth cut.

When removing the overburden in this section a gray material was uncovered that was greasy when wet and flowed. This was wasted and not put into the fill and, to guard against the possibility of slides of this material reaching the roadway, the original rock bench of 4 feet was widened to 12 feet. The suitable material was used effectively in the long approach fill.

North of the long rock cut, where another was opened up, the contractor thought that he had struck a sink hole, many of which were encountered on the job and had to be specially drained. In this instance, however, it turned out to be a small cave. Exploration to determine its extent and the possibility of danger to the road structure showed that where it met the right-of-way it was large enough to drive an automobile into the entrance. Three nearby sink holes were drained into it as well as 500 feet of surface drainage, using 18-inch corrugated metal pipe. The cave was then sealed.

Winter and Flood

The job was shut down for about two months from December 19, 1935, but drilling and shooting were continued except during the most severe weather. When spring came, the Ohio River backed up the 4 miles and flooded out the area around 14-Mile Creek. This completely cut off the north end of the job as far as equipment and servicing were concerned. Personnel was able to cross the creek in a boat but the 24 feet of water could not be navigated by the heavy equipment. The job was not shut down as fuel was taken over an old wagon road through the hills and delivered to another tank wagon on the grade through several hundred feet of 1¼-inch pipe. Both diesel fuel and gasoline were delivered in this manner for a period of two weeks.

Working the South End

The south 3.5 miles of the job below the Creek were operated with the same type of equipment as at the north end except that the excavation was handled by a Koehring 1¾-yard shovel powered with a Caterpillar diesel engine and the hauling was done with 14-yard Athey crawler wagons pulled by Caterpillar Seventy-Five and Fifty diesels. A Caterpillar Seventy-Five diesel with a LeTourneau bulldozer roughed in the fills. On both ends of the job the earth fills were spread in 9-inch layers and rolled with Huber 10-ton gas rollers, and rock fills in 2-foot layers covered with a minimum of 2 feet of earth on the top. On the south end a 6-year old Caterpillar Sixty performed all the service jobs such as hauling the compressors, moving the grease house, and was the only gasoline-powered tractor on the job.

Drainage Structures

This was an outstanding job from the standpoint of drainage structures alone as it was the first in Indiana on which all the culverts are of the arch culvert type. Seven of these culverts were built primarily because foundations could be carried to rock economically, giving a great saving in construction over the standard flat slab top or box culverts. All the culverts had 12-foot clear spans and the clear heights varied from 10 feet down to 6 feet. The lengths varied from 104 to 165 feet.

On a total bid of about $206,000 on this job, the item of drainage structures amounted to $56,000, rather a large proportion of the total bid to be accounted for by drainage structures on a rock job as large as this.

C. & E. M. Photo

One of the Arch Culverts 7 Feet High and 12-Foot Span

Quantities

Item	Quantity	Unit Price
Excavation, common	211,527 cu. yds.	$0.30
Excavation, solid rock	109,264 cu. yds.	0.70
Excavation, special borrow	1,728 cu. yds.	0.40
Overhaul, one balance	26,823 cu. yds.	0.05
Concrete in structures, Class D, 1:2:3½	2,791 cu. yds.	16.85
Reinforcing steel, structures	273,133 pounds	0.036
Standard concrete paved side ditch	1,390 feet	0.75
Special concrete paved side ditch	410 feet	2.50
12-inch corrugated metal pipe	272 feet	1.40
15-inch corrugated metal pipe	666 feet	1.50
18-inch corrugated metal pipe	124 feet	1.75
24-inch corrugated metal pipe	436 feet	2.50

Personnel

The contract date for the completion of this work was October 1, 1936, but the contractor finished early in September. This 7.048-mile project was divided by the contractor, John Oman, Jr., Nashville, Tenn., into two sections for operation, using the natural division afforded by the 14-Mile Creek. On the northern section R. W. Kirby was Superintendent and on the southern section Boyd T. Riley was Superintendent. For the State Highway Commission of Indiana the work was in charge of R. H. Harrell as Project Engineer for the entire project.

Jenkins Named Vice Pres. of Gar Wood Industries

Ralph S. Jenkins has been appointed Vice President in charge of manufacturing of all divisions of Gar Wood Industries, Inc., Detroit, Mich. Mr. Jenkins came from Minneapolis where he has resigned as General Manager of the St.Paul Hydraulic Hoist Co. to become associated with Gar Wood. In 1921, Mr. Jenkins first became affiliated with the Wood Hydraulic Hoist & Body Co., when Gar Wood purchased the Horizontal Hoist Co., in Milwaukee. Starting as an assembly foreman, Mr. Jenkins' rise was rapid. He was promoted from general inspector to assistant factory superintendent and finally to director of all the company's branches, a position which he held until 1932 when he left Gar Wood to become General Manager of the St.Paul Hydraulic Hoist Co., in Minneapolis.

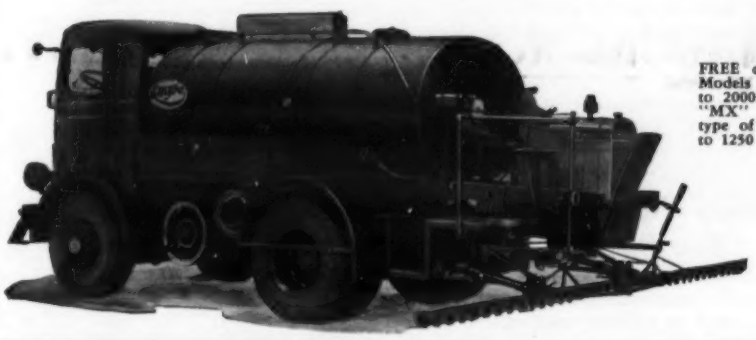
Bethlehem Opens Shop and Warehouse for N. Y. City

Bethlehem Steel Co., Bethlehem, Pa., has announced the opening of a reinforcing bar fabricating shop and warehouse at Front and Marshall Sts., Elizabeth, N. J., to serve the metropolitan area of New York. The warehouse carries a complete stock of reinforcing bars with the necessary machinery for fabricating work. The plant is prepared to handle large and small requirements and trucking facilities are available to render prompt service.

for Every Road Oil Contractor and Highway Department . . .

NEW ETNYRE CATALOGS

Before you buy any Bituminous Distributor, be sure to get full facts about the NEW ETNYRE Models "FC" "FX" and "MX" . . . embodying new features of design and construction, including the NEW *"Instantaneous Shut-Off Spray-Bar,"* which eliminates "dripping." New catalogs give complete information . . . interesting and helpful to Contractors and Highway Departments. Read why Etnyre is the most widely used Bituminous Distributor in the world.



FREE catalog No. 506 describes Models "FC" and "FX" in 600 to 2000 gallon capacities. Catalog "MX" No. 507 features another type of Etnyre Distributor in 400 to 1250 gallon capacities.

SEND FOR YOUR COPIES NOW!

E. D. ETNYRE & CO. OREGON, ILLINOIS
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BAKER

The Bulldozers That Do Not Choose Their Jobs

There's a big difference in Bulldozers. Why not choose the kind that do not pick their jobs—the kind that are ready for any assignment.

Baker Hydraulic Bulldozers are built to handle any bulldozing job. They are simply and sensibly built. Less wasted power—more effective work. With strength to spare and long life, the up-keep costs are away down.

Direct lift—easy, fast operation—few wearing parts—no gears, springs, levers or cranks—correct mounting on the tractor—accurate performance—these are more reasons why there are *more Bakers on more jobs.*

Ask for latest bulletins on Baker Bulldozers, Gradebuilders and other Baker products.

BAKER TRACTOR EQUIPMENT
BULLDOZERS
GRADEBUILDERS
ROAD ROOTERS
TRACTOR SCRAPERS
ROAD DISCS
MAINTAINERS
SNOW PLOWS

The Baker Mfg. Co.
585 Stanford Ave.
Springfield, Ill.

Making Good Equipment Since 1908

How Much Light on Rural Highways?

(Continued from page 27)

cidents occurred, the dates, time of day, and other circumstances which will help to determine whether the accidents were of a type which highway lighting can prevent. Then, for an equal period of time after the installation, the accident experience should be drawn on another diagram showing the same kinds of information. A comparison of the two diagrams will show the types of accidents which have been prevented and the types which still persist.

This is a valid basis for conclusions as to the effect of highway lighting upon such kinds of accidents at certain types of locations which have the same elements as this particular one. That is all the demonstration will prove, so far as safety is concerned. However, a sufficient number of such demonstrations and of studies of installations which have been made will show the various types of locations and conditions at which expenditures for highway lighting will result in accidents prevented.

Intermittent or Continuous Lighting

Now, what are some of the locations which may be expected to be accident prone in the absence of highway lighting? I do not say that they actually will be, for that remains to be demonstrated by a study of the accident experience. However, there are locations which are more likely to be accident prone than others, so far as night accidents are concerned.

First of all, there is the intersection of two important highways where the general layout may not be readily visible to approaching traffic by illumination from ordinary headlights. Then, there is the underpass beneath a highway or railroad with curves in one or both approaches, which make ordinary warning signs or reflectors inadequate. Again, the combination of horizontal and vertical curves, such as the highway curve just beyond the crest of a hill, may lead the unsuspecting driver into trouble unless the road ahead is clearly defined.

To be sure, these are not extensive lengths of highway, but I doubt that the first approach to highway illumination for safety is one of lighting extensive lengths of highway. That is more likely to be a matter of connecting up individual locations which require lighting for safety, when they are sufficiently close together to make the connection desirable. Some kind of criterion will have to be established for determining when such lighting should be continuous rather than intermittent.

Formerly, it was not uncommon to establish entire through streets and to spend hundreds of dollars for signs to protect a very limited number of intersections which would require stop signs by actual test. More recently we have held that our primary application of protection to such points is to safeguard first those intersections which require stop signs and to treat other intersections by stated-speed slow signs or other types of protection or revision if, indeed, any type is necessary. We recognize, however, that after stop signs become sufficiently common along a street, drivers come to depend upon them and to look upon the street as a through street. It then becomes necessary to place the stop signs at all approaches from side streets and to establish it as a through street. The present policy or criterion is that when one-third of the approaches from side streets require stop signs, the street should be made a through street with stop signs at all intersections.

I believe that a somewhat similar application will have to be made to highway lighting to determine when the lighting should be continuous instead of intermittent. I do not know whether this may be when a third of this length requires lighting, or a half, or some other part. However, I do believe that the criterion will be of this order and that it should be established on some such basis.

The determination of the criteria for the need of highway lighting for safety is imperative, for I believe that it will not attain the recognition in the traffic engineering field which it deserves until the criteria for the need of highway lighting have been established upon the accident experience basis. Experience with other remedies has brought us to a day when every highway improvement must demonstrate its possible and practical contribution to safe and efficient travel. The accident experience approach is the only one which will demonstrate that contribution.

From a paper presented before the Thirtieth Annual Convention of the Illuminating Engineering Society at Buffalo, N. Y.

Flexible Vibrator Shaft Now Operates Star Drills

Further adaptation of the flexible shaft unit, used to vibrate concrete, to other purposes, has been announced by the White Mfg. Co., Elkhart, Ind. A new hand hammer has been developed to attach to the flexible shaft to operate a hand star drill or a concrete surfacing tool. The flexible shaft may be driven either by the standard White gas engine unit or an electric motor. The hand hammer was added to this company's line to extend further the service of the vibrator which is already used to vibrate concrete in mass or along forms and joints, and mounted on single or double wooden sleds for surface vibration.

New Factory Building for Bay City Shovels

Bay City Shovels, Inc., Bay City, Mich., has let a contract for a new factory building, 200 feet long by 85 feet wide. This addition of 18,000 square feet of floor space will match in design and connect with the present Assembly Division. The structure is fire-proof and of daylight construction and will be equipped with the latest design machine tools and a new overhead traveling crane.

The Machine Shop Division which has been operating both day and night since May, 1936, will be continued on double shift. Production during 1936, both from viewpoint of units shipped and dollar volume exceeded all previous Bay City records.

The expansion has been necessitated by the inability of the present Bay City plant and facilities to handle the increasing demand for Bay City products including convertible power shovels, cranes and draglines, in ten sizes from 3/8 to 1¼ cubic yards; and trailers and dragline buckets. It is expected that increased production will start April 15.

Grover Whalen, President of the New York World's Fair of 1939, reports that more than 5,000,000 cubic yards of soil has been shifted, leaving only 2,000,000 cubic yards yet to be moved before the job of grading the 1,216.5-acre site at Flushing Meadows is complete.

A Trailer for Every Heavy Duty Requirement

- Fully Reversible—Pulls from either end
- Brakes on all wheels controlled from either end
- Pneumatic Tires
  Meets all road width restrictions

Trailers of all types and up to any capacity.

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C. R. JAHN CO., LaCrosse, Wis.

Announcing the New Gardner-Denver WDS Wagon Drill Built to Meet the WIDEST Variety of Drilling Conditions . . .

The WDS Wagon Drill is adjustable so that holes may be drilled at any angle from horizontal to vertical. The Gardner-Denver drills are designed to give maximum cleaning on any depth of hole.

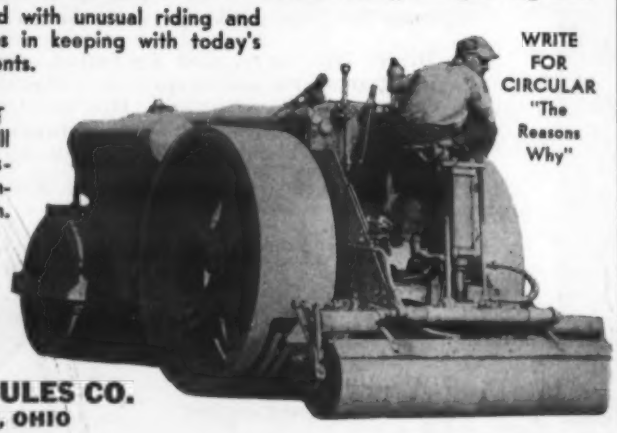
HERCULES IRONER ROLL

Remarkable results in eliminating high spots

Produces a road with unusual riding and wearing qualities in keeping with today's heavy requirements.

SCARIFIER ATTACHMENT Delivers the full scarifying pressure along the entire row of teeth.

GRADER BLADE, SCARIFIER and IRONER ROLL make the HERCULES a complete, efficient maintenance unit.



WRITE FOR CIRCULAR "The Reasons Why"

THE HERCULES CO.
MARION, OHIO

Model UMB 6-Foot Change Wagon Drill

An extremely light and mobile unit—may be used where a larger wagon drill is impractical. Any standard Gardner-Denver Drill may be used on the 6-foot wagon drill.

GARDNER-DENVER COMPANY
Quincy, Illinois Since 1859

GARDNER-DENVER
MORE FOOTAGE PER SHIFT—EVERY SHIFT

Equipment Used by N. D. To Maintain Its Roads

The North Dakota Department of State Highways spent approximately $1,630,000 for maintenance of 6,686 miles of highway during the year 1936. Of this amount $360,000 was spent on snow removal. The following equipment was used in the maintenance of this mileage:

Tractors

Caterpillar, 19
Oliver Hart Parr, 3
International, 14
Allis-Chalmers, 13
Case, 2
Twin City, 1

Graders

Adams, 7
Austin, 5
Russell, 11
Caterpillar, 5

Planers

Adams, 16
Caterpillar, 9
Galion, 2
Western, 2

Trailer Graders

Stockland, 1
Shawnee, 1

Elevating Graders

Caterpillar, 2
Stroud, 1

Motor Patrols

Warco, 11
Austin, 41
Edwards, 2
Rome, 1
Adams, 17
Hawkeye, 3
Caterpillar, 15
Galion, 17
Russell, 11
Allis-Chalmers, 10

Trucks, 1½—2-Ton

Ford, 9
Chevrolet, 7
Dodge, 1
Reo, 8
International, 6
G. M. C., 5

Trucks, 3½-Ton and Over

Coleman, 2
International, 2
Oshkosh, 6
F. W. D., 4
Walters, 4

Rotary Snow Plows

Snogo, 5

Road Sweepers

Magnetic, 1

Center-Line Striper

White, 1

Road Rollers

Wehr, 1
Galion, 1
Austin, 1

Oil Distributors

Austin, 1
Rosco, 1

Snow Fence

550 miles of Wood-Slat Snow Fence.

A.E.D. Annual Meeting In New Orleans, La.

The Associated Equipment Distributors held its Eighteenth Annual Meeting in the Roosevelt Hotel, New Orleans, La., on January 10, 11 and 12, 1937. A remarkably good attendance resulted in interesting sessions which were filled with the reports of the various committees, and papers on the Walsh-Healey Bill and the regimentation of business by J. S. Gilman of Wm. H. Ziegler Co., Minneapolis, Minn.; the Robinson-Patman Bill by E. K. Hurst, Western Material Co., Sioux Falls, S. D.; Re-Sale Prices and Anti-Trust Laws, by A. C. Blaisdell, Secretary of A.E.D., who unfortunately was ill in Cincinnati at the time of the meeting. Other papers included an analysis of the Rental Business by Eldon M. Farnum, Geo. F. Smith Co., St. Louis, Mo.; and Some Random Thoughts on Salesmen's Compensation, by Victor L. Phillips, The Victor L. Phillips Co., Kansas City, Mo.

C. & E. M. Photo
The Associated Equipment Distributors Attending the Eighteenth Annual Meeting at New Orleans

The officers elected for the coming year are: President, G. F. Lowe, Chicago, Ill.; 1st Vice President, A. F. Sersanous, Portland, Ore.; 2nd Vice President, Victor L. Phillips, Kansas City, Mo.; Secretary-Treasurer, A. C. Blaisdell, Cincinnati, Ohio. The new directors are: J. S. Gilman, Minneapolis, Minn.; E. K. Hurst, Sioux Falls, S. D.; F. S. Jenison, San Francisco, Calif.; H. W. Fletcher, New Orleans, La.; E. P. Phillips, Richmond, Va.

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WELL POINT SYSTEMS
WILL DRY UP ANY EXCAVATION
Faster—More Economically
Write for Job Estimate and Literature
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MORE YARDAGE *per day*
because of power and less cable overhaul.

The super digging power of the Williams "Champion" Bucket is developed by an exclusive power-arm arrangement of lever and block-and-tackle.

And here's the dragline bucket for BIGGER OUTPUT
The special alloy steel in the Williams "DXL" Dragline Bucket enables a lighter yet stronger construction. The result—freer handling and a saving of power time.
•
We also build Power-Wheel and Multiple-Rope Buckets. Write for bulletins.

THE WELLMAN ENGINEERING CO.
7012 Central Ave., Cleveland, Ohio
WILLIAMS BUCKETS

✓easier STARTING
✓smoother RUNNING
✓lower UPKEEP

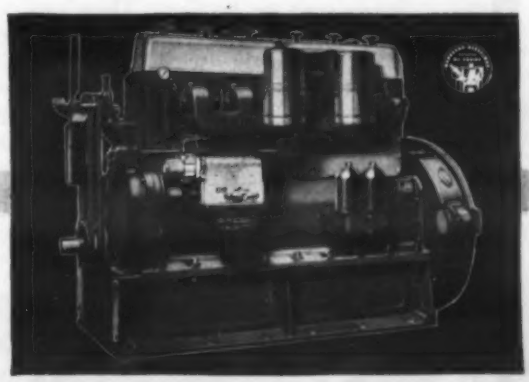
...with *Low-cost* HIGH SPEED DIESEL FUELS

To burn "modern high speed diesel fuels" you do not need to use hard-starting compression ignition engines. The Waukesha-Hesselman Oil Engine is a low compression, solid injection oil engine with precisely timed electric ignition. It burns these fuels with high efficiency; yet weighs no more than, and starts as easily as, a gasoline engine. Low compression and electric ignition give these advantages—easy starting, smooth running, low upkeep—all with low cost fuel. And the first cost of the Hesselman is moderate, too.

The Lorain "95" shown . . . operating a 70-foot boom and a two-yard bucket . . . is powered by a Model 6-ELH, six-cylinder, 6½ x 7 bore and stroke, Waukesha-Hesselman Engine. It is owned by the Plymouth Excavating Co., Plymouth, Pa., and is used for stripping operations in the anthracite regions of Pennsylvania.

Waukesha-Hesselman Oil Engines range in size from 20 horsepower to 300 horsepower, both four and six cylinders. You'll want complete details. Write today for Bulletin 1000.

WAUKESHA MOTOR COMPANY



WAUKESHA • WISCONSIN

WAUKESHA ENGINES

The New Galion Model GH-56 Hydraulic Hoist

New Hydraulic Hoist On Display at Road Show

The most recent Galion hydraulic hoist Model GH-56 was on display at the booth of the Galion Allsteel Body Co., Galion, Ohio, at the Equipment Exhibit held in conjunction with the American Road Builders' Association Convention last month.

The GH-56 has new type lift arms designed to add strength and durability to the hoist. Patented equalizing lift links are designed to increase the lifting efficiency of the hoist and are responsible for low and uniform oil pressures. All points of bearing are equipped with bronze bushings and oil connections, as are all Galion hydraulic hoists.

The Galion Allsteel Body Co. manufactures a wide range of hoist and body models for both light and heavy-duty trucks, short and long wheelbase lengths, trailers and tandem units and will be glad to send complete details on request.

New Pamphlet on Strength and Durability of Concrete

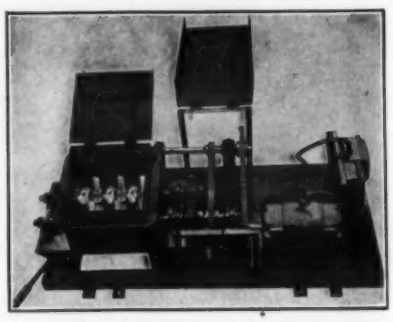
Circular No. 124 of the Institute of Research, entitled "The Strength and Durability of Concrete" by Inge Lyse, Research Associate Professor of Engineering Materials, has recently been published by Lehigh University.

This 25-page pamphlet presents the results of an extensive investigation of the strength and durability of concrete containing eighteen different cements, thirteen of which were standard portland cements and five were high-early-strength cements. Chemical analyses, fineness determinations and sugar solution tests were made on all cements. Compression tests were used as an indication of durability.

A limited number of these pamphlets, containing detailed information on these tests and their results with tables and diagrams, are available for free distribution. Copies may be secured by writing to Lehigh University Publications, Lehigh University, Bethlehem, Pa., and mentioning CONTRACTORS AND ENGINEERS MONTHLY.

New Pug-Mill Mixer For Laboratory Use

A pug-mill mixer that handles a batch of 40 pounds or less and is designed particularly for laboratory use has been announced by Frank B. McGrane, 44 Bigelow St., Quincy, Mass. The design of bituminous mixes to meet the different requirements of heavy, medium and light traffic is often confusing. This mixer makes it possible for the engineer or chemist to mix small bituminous batches that can be laid and plotted for actual observation under various traffic conditions.



A New Mixer for Laboratory Use

Today there are many patented bituminous combinations and methods and when the question of merit arises in the minds of engineers, contractors or material producers who are contemplating the manufacture of a particular product, this laboratory mixer makes it possible for them to experiment with all mixes and decide which one best meets their needs.

The mixer is driven by a totally-enclosed 1½-hp motor with a reduction of 1,200 rpm to 70 rpm through a silent roller chain drive. The mixer has manganese plate liners, high carbon steel shafts, and special process steel mixing blades and stuffing boxes.

McGrane's commercial pug-mill mixers are made in 250, 500, 750, 1,000, 2,000 and 4,000-pound batches.

TENTS
TARPAULINS
WINDBREAKS
The Fulton line is sold through Contractor Supply Dealers in every state. A quality line priced right. Ask for SHUREDRY and FULTEX Tarpaulins, Tents, Windbreaks.
Write our nearest plant today for catalog, samples and price lists.
Fulton Bag & Cotton Mills
Manufacturers Since 1870
ATLANTA ST. LOUIS DALLAS
MINNEAPOLIS BROOKLYN NEW ORLEANS KANSAS CITY, KAN.

"You don't get any of that jerky action with these tractor-type crawlers. You start smoothly—move smoothly because there's true rolling action throughout the whole assembly."—Jack Lumree—Shovel Operator.

Look at these Tractor-type shoes

GET THE STORY OF TROUBLE-FREE TRAVEL

● The shoes used on these tractor-type crawlers are made of tough alloy rolled steel, heat-treated for extra strength. They're uniformly strong throughout—no hidden flaws—no weak spots. Designed with hinge action, they overlap each other. Stones can't get between. There's no clogging . . . no breakage . . . no loss of tractive power. They're renewable—interchangeable. You simply remove four bolts to lift out any shoe without disturbing the crawler track. It's no exaggeration to say that these P&H excavators with tractor-type crawlers will travel faster and farther with less trouble than any other machines. It's another feature that makes P&H Pacemakers faster on the job.

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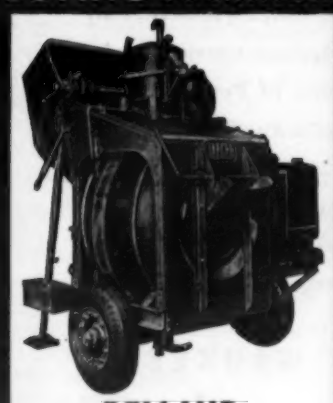


DEMAND:
- Faster Charging and Discharge Speeds,
- Machined Steel Tracks,
- 2 Wheel Mounting with Timkens and Pneumatics,
- End Discharge Advantages,
- Man-Ten Alloy Steel,

Send for New Catalog, Prices 3½S to 56S Sizes.

THE JAEGER MACHINE CO.
701 Dublin Ave., Columbus, Ohio

JAEGER

Removing the Engine of the Cab-Forward Truck Can Be Done by One Man

New Cab-Forward Trucks

One of the features of the Cab-Forward ½ to 2-ton trucks developed by the Studebaker Corp., South Bend, Ind., is the engine accessibility afforded by this design. When repair work is needed on one of these power plants, one man can easily take care of the job, even if it necessitates removal of the engine.

With the hood of the engine placed inside the cab on the Cab-Forward units, the removal of the hood is merely a matter of spinning off the six wing-nuts and lifting the metal plate. With the hood off, carburetor adjustments, as well as work on the spark plugs, carburetor filter, distributor and fan, can be easily and quickly performed by the mechanic sitting inside the cab.

Removing the cylinder head and grinding the valves of the Studebaker Cab-Forward units can be accomplished by a mechanic sitting in the cab seat, while the oil gage and oil filter pipe are easily reached through a convenient opening in the floor board.

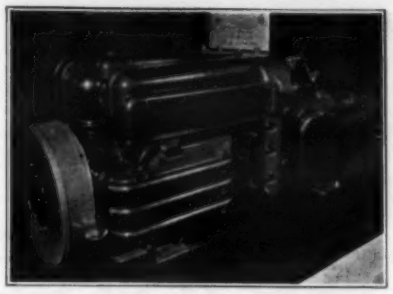
Removal of the radiator is easily accomplished, and one man can pull out the engine itself with the aid of a chain fall which is common equipment in most shops. This engine accessibility is claimed to be a means of cutting maintenance cost and, according to the manufacturer, has contributed largely to the success of this member of the Studebaker truck family.

New Oil-Burning Engine Has Unusual Features

In the new Sterling crankless opposed-piston two-stroke-cycle compression-ignition oil-burning engine, the Sterling Engine Co., Buffalo, N.Y., has developed what it believes is the simplest power plant available. The unusual construction, in that the pistons operate horizontally with two in each cylinder, eliminates more than half of the normal reciprocating parts found in the conventional internal-combustion engine.

Replacing the crankshaft is a straight shaft of greater strength which receives the power from the pistons through two inclined discs mounted one on each end. Only three force-feed lubricated bearings are required to carry this shaft.

The elimination of cylinder heads is made possible through the absence of valves, valve springs, push rods and racker arms, since all fuel and air for compression needs are admitted to the cylinders through ports that are opened and closed with the passage of the pistons along the cylinders. The same is true for scavenging air. Both atomized fuel and air are injected by pressure, and combustion proceeds with a whirling action. The air is introduced into the cylinders under a pressure of from 3 to 4 pounds per square inch. As the two opposing pistons approach each other, this air is compressed to a maximum of 500 to 550 pounds per square inch, producing a natural temperature of 1,000 degrees F. Just before this temperature is attained, the fuel is injected under a pressure of 2,500 pounds per square inch. The 1,000-degree temperature is sufficient to produce its own ignition without the aid of electrical devices. The same air processes are followed to produce a thorough scavenging of the cylinders at the end of the power stroke.



The New Sterling Crankless Oil Engine

Cylinder heads, valves and cylinder head gaskets are omitted. The usual water jacketing for cooling is removed, except that directly around the cylinders.

Piston pins are eliminated through the use of ball and pad thrust bearings at each end of what normally would be the connecting rod, leaving the pistons free to glide horizontally in a straight line without side stresses. These bearings are of the Michell thrust principle, almost identical in design with those used to take up thrust on the propellers of giant ocean liners and in huge turbines. Only one model of this engine is now in production, the CD-425, which develops 150 hp at 1,200 rpm. The engine is started through a standard electric starter with a separate generator for charging batteries.

According to the publication "Le Vie d'Italia" of the Italian Touring Club, a new super auto-speedway, 435 miles long, has been completed between Tripoli, Libya, and Gadamas in the Libyan Desert. The Auto-Strada, as it is called, was constructed by overcoming enormous physical difficulties, and is continuously kept in first-class condition. This road is said to increase greatly the commercial and tourist possibilities.

LANSING 3½-T MIXER

FOR FAST TRAILING FAST MIXING

Large mixing drum, Hyatt roller bearing wheels. Wide-tread rubber wheels and spring shock-absorbers. Alemite fittings. Lauson 2 h.p. gasoline engine. WRITE—for specifications and current prices.

LANSING COMPANY

LANSING, MICHIGAN

Chicago New York Philadelphia Kansas City San Francisco Boston Minneapolis

REX MODERN DRUM PAVERS

showed how well

IT PAID TO FORGET THE OLD STUFF

Rex Paver working on Irving Park Boulevard, Chicago

As Rex Modern Drum Pavers went into action in 1936 on every type of jobs, on congested city streets, across tidewater swamps, prairies and desert plains, they showed how well it paid to forget the old stuff.

As fast as capacity batches reached the skip, the Rex Mechanical Man put them through the mixing cycle onto the road, in specified mixing time, to the second.

You pay your crew, whatever its size, whether the paver delivers full yardage or whether it doesn't. With the Rex Modern Drum Paver you get your yardage, full-capacity batches delivered on the dot.

In 1937, on any paving job, before you bid, before you buy, investigate the Rex Modern Drum Paver—the road maker's up-to-date method of handling concrete.

CHAIN BELT COMPANY, 1666 W. Bruce St., Milwaukee, Wis.

REX PAVER

Sinclair Developes New Diesel Lubricant

The announcement of Ten-ol by Sinclair Refining Co., 630 Fifth Ave., New York City, as a lubricant which gives ten times more service hours in a diesel engine is not the result of a chance experiment or somebody's good guess, but of a long painstaking test conducted in its Bureau of Standards laboratory in East Chicago, Ind. With the acceptance and increasing use of diesel engines as power for equipment, particularly in tractor service, the need for better diesel lubrication has become imperative. Therefore Sinclair set up a single-cylinder Caterpillar diesel engine for accelerated laboratory operation testing. A full scale 6-cylinder Caterpillar diesel was also set up for field service checking.

Through this work there was developed an alloyed lubricant for Caterpillar diesels which assures greatly increased hours of operation between shutdowns, together with much-reduced cylinder liner and piston ring wear. This new Caterpillar diesel lubricant, known as Sinclair Ten-ol, has the following ten service factors that cut operating and maintenance costs: 1. High film strength under high temperatures and pressures; 2. Resistance to ring sticking even when operating with high output; 3. Abnormally low cylinder liner and piston ring wear even with overloads; 4. Open oil channels and free-acting oil control rings; 5. Low blow-by of gases so that corrosion of cylinder walls and contamination of the crankcase oil are practically eliminated; 6. Non-carbonizing; 7. Non-sludging; 8. High oiliness; 9. Economical oil consumption; 10. Uniform quality.

Ten-ol, by possessing the proper balance of these characteristics, is said practically to dispose of the customary end-of-season tear down of diesel engines. For example, in some of the heavy-duty high-output laboratory tests, Caterpillar diesels were operated 2,000 hours lubricated with high grade straight mineral oil, and also with Sinclair Ten-ol. After the tests, measurements revealed that the wear on cylinder liners of the engines lubricated with Ten-ol was less than one-tenth of the wear in engines lubricated with the high grade straight mineral oil.

Progress is being made on international highways; the Inter-American Highway; the Bolivar Highway, connecting Venezuela, Colombia and Ecuador; the European International from London to Istanbul; and the All-Red from Cape to Cairo in Africa.

Lincoln Electric Opens New Offices in Chattanooga

The Lincoln Electric Co., of Cleveland, Ohio, has announced that Robert Daniels will be in charge of that company's office at 1015 Hanover Street, Chattanooga, Tenn. Mr. Daniels has been associated with the company since April, 1934, and has practical as well as an engineering knowledge of arc welding.

The new Chattanooga office is equipped to give practical demonstrations of welding with any of the Lincoln electrodes and welding machines, in addition to which Mr. Daniels is demonstrating the dual continuous control, the new system of welding current control featured in the new Lincoln Shield-Arc SAE welder, which permits continuous adjustment of both voltage and current.

"Form-Set"
PURPLE STRAND
The last word in Wire Rope quality. Many operators today have found greater economy in the use of "Form-Set" Purple Strand because the slight additional cost in no way compares with the greater and more satisfactory service obtained in its use— Prove this in your own way by using it on your next job.
WILLIAMSPORT WIRE ROPE CO.
WILLIAMSPORT, PENNA. Other Offices in all Principal Cities 122 S. MICHIGAN AVE., CHICAGO

BARGAINS in Construction Equipment

The directors of the Middle Rio Grande Conservancy District have authorized us to offer the last of their construction equipment, made available by completion of the construction work, at bargain prices. This equipment is all in good condition and includes

50B Bucyrus-Erie Diesel Draglines
775 P & H Diesel Draglines

pumps, compressors, lighting plants, tractors, shovels, pile driving outfits, concrete mixers, scales, Insley concrete placing outfit, concrete heaters and vibrators, gravel screening plants, compressed air drill sharpeners, shop equipment, gasoline powered hoists with and without skips, bar benders and cutters, carbic floodlights and other items at bargain prices. Wire or write for complete list and prices

R. L. Harrison Co. Inc.
Albuquerque New Mexico

Selecting Labor For PWA Projects

Physical Examinations Reject as High as 70 Per Cent of Men But Method Builds Self-Esteem and Morale of Those Chosen

By L. M. DEARDORF
Superintendent of Construction, W. L. Johnson Construction Company, Hicksville, O.

ANY contractor who secures a Public Works project with the Highways, PWA, U. S. Engineers, or any of the other departments of the Federal Government is required, as a part of the labor regulations, to submit a requisition for his employees to the National Reemployment Service. The National Reemployment Service is dominated by the WPA organization to the extent that all semi-skilled and common labor are furnished only from relief lists. In the majority of cases those unfortunate individuals who are still on relief are there only by reason of a mental or physical deficiency. They have done very little work during the past five or six years and are pretty thoroughly demoralized mentally; physically their bodies are run down, about like an old paver that has been standing alongside the road for a corresponding period.

Handling Examinations

Our procedure in carrying out physical examinations for our employees is as follows: The contract having been awarded, and the superintendent assigned to the project, one of his first important preliminary instructions is to talk to the doctors in the vicinity of the project and explain to them the problem which we face in securing competent physically-able workmen. If the M. D. shows any sympathy in our problems and troubles, we negotiate for mass examination of the employees. The price paid for the examination is from $1.00 to $2.50.

The findings have been very interesting on the various projects as the following facts will testify. On one project where 85 men were examined 20 of these were rejected for these reasons: three hernias; one leakage of the heart; one evidence of intemperance and a large tumor on shoulder; one very nervous, heart trouble, throat irritation, bad teeth; one deaf in right ear; one high blood pressure; two with only one eye and too old; one with defective hearing; one with bronchial asthma; one with lumbago; one with frail makeup, bronchial trouble, bad wrists, illiterate; one partial stiffness in left elbow joint; one anaemic; two general makeup bad, unalert, mentally and physically; two too young for construction work; one too old and too frail for construction work.

Rejections Are Large

Another project in Ohio got under headway in June when the weather was extremely hot. The project superintendent contacted the Regional Employment Center from which the labor was assigned. The Employment Center was advised as to the nature of the work, that only men fit physically and mentally could be accepted, that each man would be physically examined by a competent physician before being accepted. The Employment Center gave us wonderful cooperation. Men from relief rolls were first called to the Employment Office for an interview before assignment, and only such men as could show they were physically fit and able-bodied were assigned to our project. On one requisition for 30 laborers, the Employment Center called to their office 100 men who were on relief. Seventy-eight men reported. Of these, the Employment Officer turned down 74 because of old age or physical disabilities. Four of these 100 men were assigned to our project; 3 reported for work. Of these three, one was disqualified by physical disability, and one was discharged after being on the job four hours.

For the following three weeks there were many rejections, which included those rejected by the physician and many others who had come to the project with no intention of attempting to do a day's work. In fact about 60 per cent of those examined and found physically fit were not mentally inclined to do hard labor. We would first send an applicant to the foreman for a day's trial work, and if he showed an inclination to work he was given a physical examination. If not, he was discharged and we were saved the trouble and expense of an examination.

About the first of July a number of contractors were finishing their projects and releasing their labor. The Employment Center transferred those men who had a relief status to our project and discontinued sending us men from the unemployed ranks. Our number of rejections then fell from over-70 per cent to around 10 per cent.

Good Effect on Morale

There is a certain effect on morale in carrying on physical examinations in that they give the man who is employed a feeling that he is just a trifle superior to the general run of people who are available, and this feeling is revealed in the interest which he takes in his work and the building up of morale on the project.

Expense High But Gives Returns

The matter of physically examining a number of employees on a Public Works Project is much more expensive than in any other industry due to the regulation that semi-skilled and common labor do not become a part of the contractor's organization, but are only on the present project and the contractor must build a complete new organization from skilled labor on down when he moves on to another project.

An advantage in physical examinations is evident when you notify the Employment Center that the men will be subjected to a physical examination. The Employment Center is much more particular. We have found the Employment Service interested in the physical examinations and they have given us every reasonable cooperation.

We have heard no objections from the employees, organized labor, or the public with reference to our method of doing this phase of our business. We, therefore, urgently recommend that every contractor-employer adopt physical examinations for his employees. We consider our adoption of physical examinations for construction employees another stepping-stone along the road to safety.

—From a paper presented before the Twenty-Fifth National Safety Congress at Atlantic City, N. J.

Good Engineering and Good Products Make Good Roads

On Massachusetts' Famous Circumferential Highway, Socony Binders Bituminous Macadam.

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STANDARD BRAND SOCONY ASPHALTS AND ROAD OILS

SOCONY-VACUUM OIL CO.
INCORPORATED
STANDARD OIL OF NEW YORK DIVISION

Laboratory Controls Wayne County Work

(Continued from page 25)

operates under the direct supervision of the laboratory and takes cores of all pavement constructed. Some cores are taken after the pavement is seven days old, while others are of fourteen-day and twenty-eight day pavements. The cores are truly representative samples. The machine is equipped to drill either a 4-inch core or a 6-inch core, depending on the depth of the pavement. The cores are immediately submitted to the laboratory where the depth is checked and then the usual compression tests are performed. A thorough visual examination is given to note the consistency of the constituents. During the nine years that the laboratory has been in operation, over 10,000 cylinders and cores have been tested.

Reports

Daily and weekly report cards showing the results of slump tests, the cement ratio per cubic yard, conditions of the subgrade and weather conditions are sent to the laboratory. These reports are checked with the results of the compression tests performed. In this manner an accurate check of all pavement laid and conditions governing the construction is maintained.

Since water plays an important part in concrete construction, it is necessary that we have control of it. When the water for mixing purposes is obtained from natural sources, such as rivers, lakes, etc., samples are submitted to the laboratory for testing. The water is tested for impurities and must be chemically inert before it is accepted for use.

In addition to the standard mixes, special mixes are designed for high-early-strength concrete, using either standard or a high-early-strength cement. This type of concrete construction is used at special intersections or sections where it is impracticable to close the road to traffic, as well as for concrete patching.

The design of the mix for concrete bridges and other structures is also controlled by the laboratory. Representative samples of materials are taken and cylinders are molded as in the case of pavements.

Bituminous Material Tests

The testing of bituminous materials for use in highway engineering dates back to the early days when only a few crude physical tests were applied. These tests, while reasonably satisfactory for those experienced in the use of the then limited number of available materials, were not based upon sound scientific principles. The gradual increase in the number of materials available, the widely varying characteristics of different types of these materials, and the many methods of treatment and construction in common use, have necessitated an improvement of the older tests.

In the course of our operations, we use a great variety of these materials such as asphalts, emulsified asphalts, tars and water-proofing materials. Some are used for patching and pouring cracks and joints, while others are used for bituminous surface construction. Our laboratory equipment provides facilities for testing all such materials, including quantitative and qualitative chemical analyses. Premolded expansion joints are also tested for bitumen content.

Miscellaneous Tests

We also use large quantities of paints for the painting and protection of road signs, guard rails, equipment, buildings and structures and for pavement marking. It is very essential that the paint used for these purposes be of the best quality so as to withstand severe weather conditions and wear due to heavy usage. All paints are sampled and tested at the laboratory before acceptance. In this manner we are always assured of obtaining the best quality of paints available and the cost of such tests are negligible when compared to economies effected.

All gasoline and lubricating oils and greases are sampled and tested before acceptance. The gasoline is tested for its vapor pressure, percentage of gum, sediment and distilling range. Oil is tested for its carbon residue, cold test, viscosity at both high and low temperatures and flash and fire points.

The testing laboratory also makes tests of all sewer and drain tile up to one per cent of the amount used. These tiles are tested for compressive strength and percentage of absorption. In this manner we are always assured of receiving only first grade materials. When we stop to consider that during the construction of

(Continued on following page)

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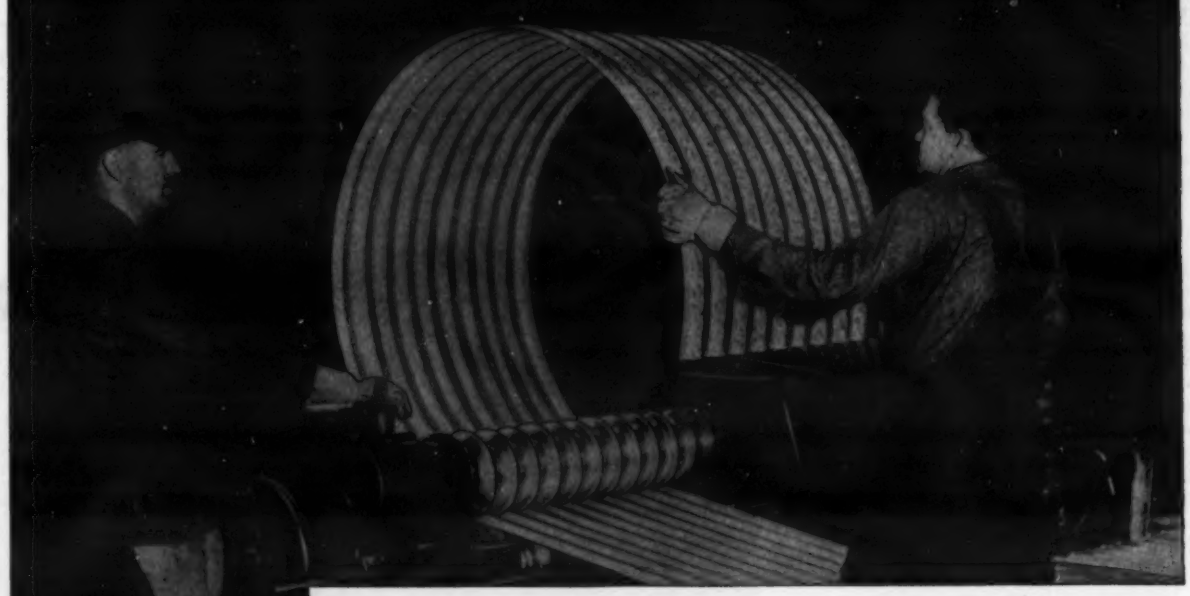

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(63)

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GOHI CULVERT MANUFACTURERS, INC., . . . NEWPORT, KY.

Lab. Important in County Road Work

(Continued from preceding page)

the Wayne County Airport over 1,000,000 feet of drain tile was placed in addition to the many miles of trunk sewer lines, it can be readily seen that if we had depended on outside agencies to perform these tests, the delays encountered, and the cost of these tests would have increased the drainage costs.

Tests are performed on dust layers such as calcium chloride in order to establish the properties. All coal used for fuel is tested to determine the heat content, the amount of sulphur present and the percentage of ash.

Laboratory Equipment

As to the methods of conducting the tests in the laboratory, accepted standards and methods are being followed. New equipment and apparatus have been added from time to time and these are always of the latest type and design. New uses are always found for obsolete equipment. For example, we are using an old type viscosimeter for oil baths.

A Tinius Olsen compression machine having a capacity of 200,000 pounds is used to perform the compression tests on the concrete cylinders and cores. This machine has paid for itself several times in the controlling of the designed strength of concrete.

A De Khotensky constant temperature bath is used for chemical and cultural tests on oils, tars, asphalts and the like. It is electrically operated and maintains a constant temperature within one tenth of one degree Centigrade. A Humbolt Penetrometer is used for determining the consistency of semi-solid and solid bituminous materials. A Cleveland open cup tester is used for determining the flash and fire points of less volatile materials such as heavy bituminous materials, lubricating oils, etc., while a Tag closed tester is used for the same purpose with medium volatile materials and liquids. A Tag thermostatic viscosimeter is used for the measurement of resistance to flow of asphalts and lubricating oils. A Saybolt jet is used for the oils and this can be interchanged with a Furol for the asphalts. In performing similar tests on tars, the Engler viscosimeter is used.

A ductility machine is used to some extent in the testing of asphalt cements. A Rotarex centrifuge is used to determine the sediment in oils, both water and solids and also used for extractions on bituminous materials. One of the latest types of drying ovens that we have in the laboratory is the Cenco oven with a revolving shelf. It is a constant temperature oven with a variation of about one tenth of one degree Centigrade and with a maximum temperature of 200 degrees Centigrade.

In conducting the various tests on coal, we use a variety of equipment and apparatus. A Rifler sampler is used to separate the coal. A Peroxide calorimeter is used to determine the heat content and a Parr turbidimeter to determine the sulphur content. The Ruffler furnace is an electric kiln used to determine the ash, and a Denver fusion furnace is used for the fusion test. An electric pyrometer is also used for the measurement of heat.

In addition to this there is other equipment such as screens and sieves, condensers, distillators, desiccators, chemical balances and other scales.

A complete binocular microscope outfit is used for the more scientific study of substances and especially used for botanical and biological study in connection with our Forestry Division.

Sampling

Since the purpose of laboratory testing is always to secure reliable information about the qualities and properties of a material, the proper selection of a sample is of vital importance. Our samples are very carefully selected at all times. Care is taken to insure that the samples are truly representative as we realize that unless the sample is properly taken, the work of the laboratory, although perfect in every detail, will be useless, or worse, misleading and perhaps unjust to someone.

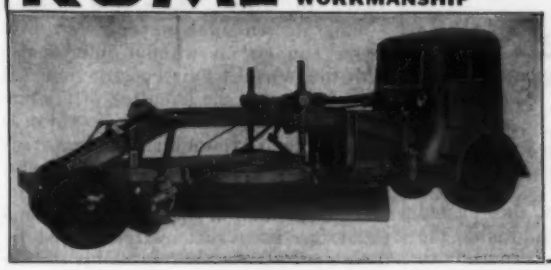
Research

Extensive research work is carried on at all times at the laboratory. New methods are devised for the securing of the best quality of road surfaces. Such work consists of the determination of admixtures, waterproofing, placing and finishing and curing such surfaces. At the present time we are making an extensive study of soil conditions.

Economies Effected

As to the economies effected through the work of the laboratory, if this were to be considered in dollars and cents it would reach a surprisingly high amount. There are no failures due to the use of faulty materials. Through its efforts the laboratory insures that the materials entering into all projects are of a uniform quality and in accordance with the latest standard specifications. Very few rejections are made on materials due to the general knowledge that laboratory inspection and tests are performed to verify the fact that all requirements and specifications are met before any material is accepted. Our laboratory can determine whether or not a product is good and will or will not suit the purpose for which it is intended. A general survey of all available data collected to date has proved our point and indicates that a laboratory is a necessary adjunct to every good road building organization, and affords a constant source of useful data for future reference and research.

ROME DESIGN MATERIALS WORKMANSHIP



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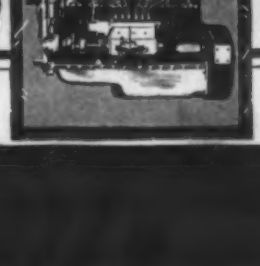
HERCULES  **ENGINES**

This Unit Maintains the Hauling Roads at the World's Fair Site

Preparing the Site for World's Fair

(Continued from page 29)

arations nearby.

The Federal government has passed appropriate resolutions endorsing the Fair and asking foreign governments to participate, and besides this, will spend a substantial sum of money for an exhibit and probably for some dredging in Flushing Bay.

Top Soil Reclamation

One of the large, and unusual, projects necessary to the satisfactory preparation of the grounds for the World's Fair in addition to the grading described at the beginning of this article, is the preparation of sufficient top soil to permit the growth of lawns on the raw ash fills. It is estimated that about 400,000 cubic yards of top soil will be required. After the Fair, the removal of temporary buildings, roads and walks will necessitate an additional 350,000 cubic yards of top soil to complete the top soiling of the park areas.

It was found that there was not enough ash material on the site to fill all the low meadow areas. To avoid going outside the property for fill material it was decided to reduce the ash fill requirements by creating two large lakes, necessitating the excavation of about 800,000 cubic yards of wet material from the meadows. This material, although it has great potential value as a source of top soil, is actually the "top" part of the marsh supporting a varied flora in rich profusion, and is not top soil in the sense that the term is usually applied to upland mineral top soil. It is an organic soil which might technically be called marsh muck.

This top material, consisting of cat tails, rushes, sedges, reeds, salt marsh grasses, etc., as it has died has fallen into the water where the oxidation of the plant tissues has taken place very slowly. Hence, great quantities of decayed and partly decayed plant residues have accumulated to form an organic or muck soil. This is overlaid with a densely packed mat of fibrous roots. The mat, which is 1 to 3 feet in depth, consists of undecomposed, tightly woven root masses, which cling together in unwieldy pieces up to a cubic yard in size.

The underlying muck consists of silt, clay, undecomposed roots and large amounts of black decomposed organic matter. The organic content of the combined materials excavated will average about 35 per cent by weight. It is the organic matter of fertile top soil that distinguishes that soil from a mere mass of mineral fragments. The minimum organic matter requirement in New York City and New York State specifications is 6 per cent. To raise the organic matter content of one cubic yard of ordinary Long Island sandy top soil, by the addition of commercial humus or peat, to the high percentage contained in the Flushing Meadow material would cost well over $1.00, making due allowance for the increase in volume.

It is believed that the top soil project planned for the Flushing Meadow Park, involving as it does the excavation of the material, is one of the largest of its kind ever undertaken. The plan is to reduce the bulky portions of the mat by mechanical means and, by the addition of soil amendments, to improve the soil structure, neutralize the acidity and other toxins, and thereby encourage biological activities which will effect a further physical and chemical breakdown of the material and create more favorable conditions for the growth of trees, shrubs and other plants.

Contracts are being prepared for moving most of the stockpiled material from its present position by April 1, 1937, to areas where the natural weathering and other necessary processes can go on without interference with the World's Fair construction. It is expected that the handling of the material will accomplish some physical reduction and expose large surface areas to the ameliorating influences of aeration, alternate freezing and thawing, and wetting and drying. When the material has been sufficiently affected by these natural processes, probably during the spring or summer of 1937, hydrated lime will be applied to reduce the acidity; to eliminate harmful chemical toxins or change them into less active combinations; to supply calcium as a plant nutrient and make other chemical nutrients more available to plants; to encourage beneficial biological processes; and to exert a flocculating influence on the puddled, impervious clay to encourage the formation of a granular structure in the soil.

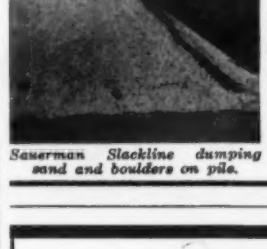
Practical experiments during the summer of 1936 demonstrated that good crops of grass and other plants could be grown where lime was applied to the excavated material and that, without lime, failure resulted. After the addition of lime to the stockpiled material it is planned to reduce the fibrous portions of the mat and lumpy portions of the muck by mechanical means. This operation will distribute the lime and the organic material of the mat through the muck and clay, and in so doing fluff up and aerate the material, and cause fractures or lines of cleavage, tending to improve the soil structure by making it more granular, open and friable.

After "aging" the material with lime for a month, one more step will be necessary before the process of soil reclamation is complete. For best results organic matter in soil must be in the form of humus that is partially decomposed. While much of the organic matter in the excavated material is in this form, the meadow mat contains large amounts of raw, undigested organic matter. Before this matter can be of maximum benefit to higher plants it must be decomposed or simplified by bacteria and other soil organisms. The excavated material, however, is practically sterile since most bacteria cannot tolerate such highly acid conditions. In order to speed up decay processes it is planned to introduce bacteria and other soil organisms by mixing the material with manure. After composting for three months the finished product will remain in stockpiles until used by the World's Fair.

Estimates of the cost of handling the material from its present stockpiled position to the finished product indicate that conversion costs will be less than the cost of purchased top soil containing the bare minimum of organic matter acceptable under New York City and New York State specifications.

New Booklet on Good Roads

"Good Roads" is the title of a new well-illustrated 52-page booklet describing the complete line of Barber-Greene road building equipment and their application to road building problems as well as discussing new trends in modern road construction. Copies of this booklet may be secured free direct from the Barber-Greene Co., Aurora, Ill.



Sauerman Slackline dumping sand and boulders on pile.

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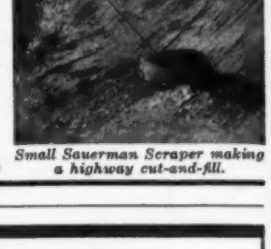

Small Sauerman Scraper making a highway cut-and-fill.

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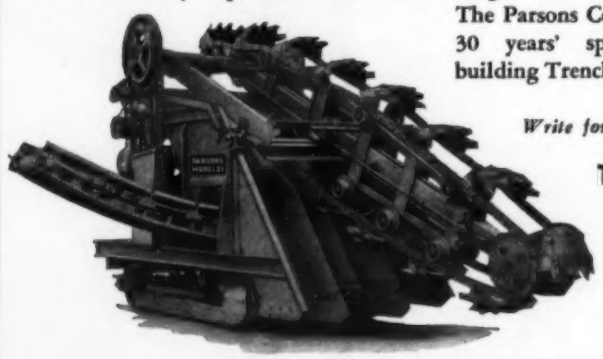

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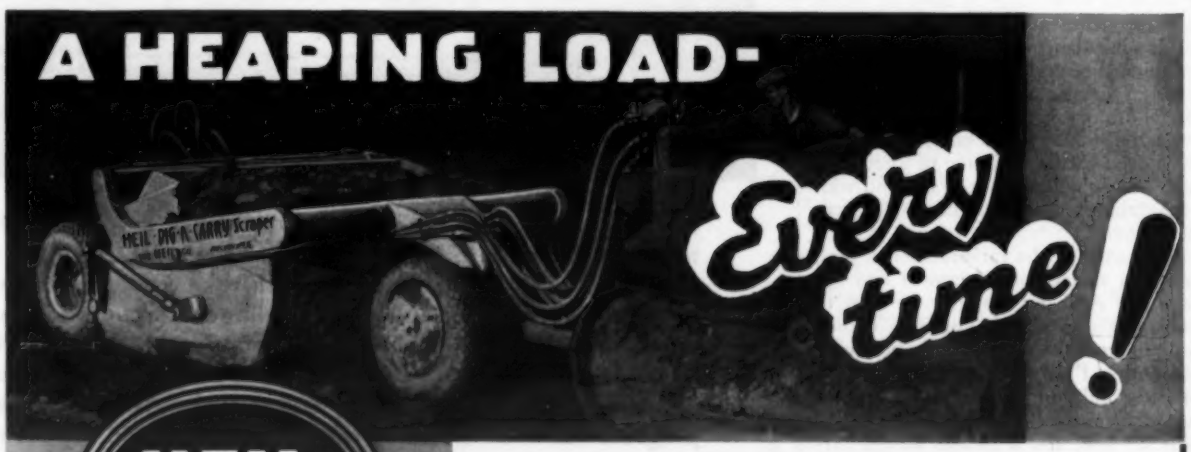

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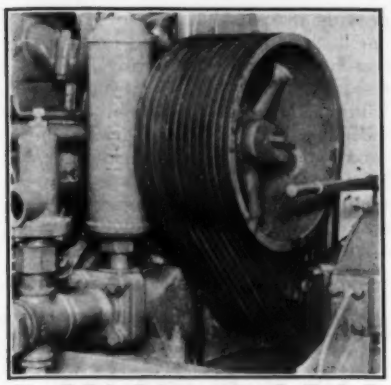


The V-Belt Drive on the C. H. & E. No. 11 Triplex Road Pump

A New Triplex Pump Built to Be Sturdier

Setting out with the determination to build a better pump free from breakdowns, C. H. & E. Mfg. Co., Inc., 3849 N. Palmer St., Milwaukee, Wis., has developed the new C. H. & E. No. 11 triplex pump in two types which delivers 80 gpm at 500 pounds pressure and 125 gpm at 320 pounds pressure. The pump frame has been increased in size and weight in order to eliminate vibration at high pressures. The countershaft now runs in roller bearings in an oil-filled housing built in the pump frame. To carry the heavy load when the pump is operating under maximum pressure, a heavy drop-forged high carbon steel crankshaft is installed.

In a vertical type pump, any sediment drawn in through the suction end is easily swept through with the water without doing any harm to the packing. The plungers are outside-packed with braided packing which can be quickly renewed. The packing glands are cupped to retain lubricating oil.

The metal valves are easily accessible, and each valve has an individual cover held down by a quickly removable clamp. The gears are steel machine cut with a wide face to insure maximum strength. The steel truck frame is electric welded, and the truck wheels are 6 inches wide for easy moving.

A Waukesha heavy-duty type 45-hp 6-cylinder engine provides the power delivered to the pump by a Texrope drive consisting of 12 V-shaped belts.

Put Highway Lighting To the Test on the Road

The close relationship which has been proved to exist between light and accidents should be reason enough for the trial installation of modern lighting systems at dangerous spots on stretches of our main highways, according to Michael A. Connor, Commissioner of Motor Vehicles for Connecticut. Speaking at the American Road Builders' Association Convention in New Orleans, he declared that practically every highway engineer or commissioner knows some danger spot along main highways leading into cities where night accidents occur regularly. He pointed to these as "ideal places where you should give lighting a chance to prove its worth. These are the spots where you should arrange for or support steps leading toward trial or permanent installations providing long-range visibility without dangerous glare. The one black mark which seems to continue to resist the efforts of all those interested in highway safety is the death and accident rate on our rural state highways. The greater number of these accidents and fatalities occur at night. Motor vehicle commissioners and others interested in safety who have compiled the record of accidents have been aware of this fact for a number of years, and have expressed themselves forcibly from time to time upon this condition.

"Lack of funds and a lack of interest on the part of the general public have, of course, prevailed against any great steps being taken to illuminate the highways, thereby making an appreciable decrease in the accidents during the night hours. During the past year, however, we can see a great improvement in the publicity in the newspapers.

"The consensus of opinion is that drivers operate too fast for night conditions, and the fact that most state highways are unlighted presents an additional hazard. The relationship between light and traffic accidents has been definitely established. Surveys by Travelers Insurance Co. and others interested in night safety prove that efficient illumination cuts night accidents in half."

Heltzel Trailer Type Bins for batching one, two or three aggregates and or bulk cement are the strongest portable units built. Every detail of construction is designed for *longest* life at capacity service. The framework of these weighing plants is structural steel—skyscraper built. One-piece jointless legs can never "knee" or spring. Bins are shop machine-riveted.

Easily trailed from job to job, these rugged units can be erected and dismantled in a matter of minutes. All materials are weighed by automatic springless dial scale without preliminary adjustments. Scale indicator automatically returns to zero when batch hopper is emptied, providing a check on every batch weighed. This important feature is exclusively Heltzel.

Heltzel Trailer Bins, made in a range of capacities from 17 to 103 cu. yds., have many advantages you can't appreciate unless you have used one. A card or letter will bring full information, promptly!

THE HELTZEL STEEL FORM & IRON CO.
WARREN, OHIO

The New Syntron Vibrator for Wall Forms

A New External Vibrator For Thin Wall Section

A new vibrator designed for attachment to the forms of relatively thin wall sections has been announced by Syntron Co., Pittsburgh, Pa. The vibrator is a simple pulsating electro-magnet with a frequency of 3,600 vibrations per minute and will operate from 110-volt, 60-cycle alternating lighting current. For vibration of the concrete in wall form placement, the vibrator is attached to the studs or wales of the wall form with a quick-acting vise-clamp.

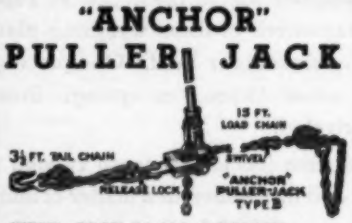
The spud and handle attachment for the vibrator quickly changes it for the vibration of concrete in flat slab placement such as the decks of bridges and floors. New catalog literature, Form 207-A, describing this vibrator is available from the Syntron Co., 400 North Lexington Ave., Pittsburgh, Pa.

Aluminum Foil Shunt for Blasting Caps

E. I. du Pont de Nemours & Co., Wilmington, Del., has recently developed a new type of shunt for short-circuiting electric blasting cap wires. It consists of a piece of aluminum foil approximately 2½ inches long which is wrapped around the bare end of the wires, covering both the wires and a portion of the insulation so that there is no possibility of any source of current reaching the bridge wire. This shunt will not shake off while the caps are in transit, it is easy to remove as it is necessary only to spread the wires to take it off, and being made of aluminum foil will not injure the hands of the user. Du Pont reports that tests have shown that this is a much more efficient short-circuit than the older types.

At the present time, the production of these shunts is rather limited, but machinery is being installed to increase this as rapidly as possible.

"ANCHOR"
PULLER JACK



THE ONE-MAN OUTFIT OF A THOUSAND USES

The most widely used Pulling-Jack in America. Comes in handy every day. Works in any position. Pulls 6000 lbs. single line; 10,000 lbs. on two line. Pulls anything—concrete forms, piling, lagging. For handling heavy machinery. Joins pipes, belts, conveyers. Stretches cables. For erection, rigging or demolition work, or what have you.

Complete outfit as shown; includes sheave block for changing direction or doubling power. Price $39.00. Net weight 66 lbs. Simple, rugged, powerful, long-lasting. Longer chains if desired.

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To sell on liberal commission basis—Street Signs, Traffic Signs, Reflector Signs and Signals, Highway Beacon Lights.
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Contractors and Engineers Monthly
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New Research Laboratory For Amer. Rolling Mill

Construction of a modern research laboratory to replace the structure which was leveled by an explosion in December, 1935, has been announced by the American Rolling Mill Co., Middletown, Ohio. Since the demolition of the laboratories, the management has been studying the problem and has decided to proceed with the construction of a new building with proper and modern facilities to house this extensive research program which has already resulted in many special grades of iron and steel sheets.

The building, to be erected in Middletown, will be constructed of porcelain enameled sheets, other decorative metal products, and glass blocks, at a cost of about $260,000, exclusive of equipment. A multiple-story building of equal floor space but of conventional construction would cost about $400,000, according to the announcement.

The laboratory, a single-story building designed and to be erected by The Austin Co., is the outgrowth of extensive research which has led to the use of sheet iron and steel as building materials. Charles R. Hook, President of The American Rolling Mill Co., points out that this structure will demonstrate the full force which low-priced sheet and strip steel can exert in reviving building construction activities. The building will provide an area of 41,900 square feet on one floor and an additional 1,600 square feet for use in X-ray testing and other research in the square entrance tower. Although there are to be more than 100 individual offices, laboratories, conference rooms, etc., abundant daylight will be furnished in all sections through vertical saw-tooth monitors closed in with glass block in continuous sections, 175 feet long and 10 feet high.

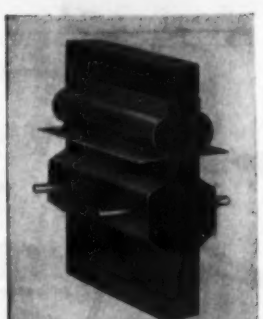
ESTABLISHED 1854

The CAMEL TRACTOR
DUMP WAGON
Combines in One Versatile Heavy Duty Unit Features of Truck, Tractor, Trailer and Bulldozer. Goes where Trucks cannot. Handles easily in limited space, forward or backward. Four to five cubic yards capacity. Rough ground or soft spots are no obstacles. Increases capacity of power shovels or elevating graders.
Send for descriptive circulars Dept. 37
SHUNK MANUFACTURING COMPANY, Bucyrus, Ohio, U.S.A.
The largest manufacturer of Road Grader Blades in the world

For Dependable Performance!

SERVICISED QUALITY PRODUCTS 1920

METAL ACCESSORIES FOR HIGHWAY CONSTRUCTION



An extruded fibre mastic product provided with grooves for the metal accessories used in connection with flow control. Escape dowel locks and supports plus upper escape and seal combination control the oozing tendencies in this joint. The metal forms contribute to the rigidity of the joint and afford a simple economical means toward a positive seal. The means of properly housing the dowel bars so as to hold them in rigid position while the concrete is being poured is effective and certain.

METAL housings—escape containers—and housing seals for expansion joints are now being widely recommended by engineers for State—Municipal—Railroad and Civil work.

• SERVICISED metal accessories have been carefully designed and engineered—therefore you may be sure that the performance is right—the quality is right and the price is consistent with SERVICISED QUALITY.

• We specialize in extruded forms to meet the needs of engineers—write us for information or literature on your specific problem.

ARM DOWEL SUPPORT can be used in connection with any type of preformed expansion joint material. Provides a rigid support for the dowel bars and keeps them in perfect alignment. Dark openings shown in end section are air cells which give maximum collapsible volume and control extrusion.

METAL SIDE EXTRUSION SHIELDS for premoulded asphalt expansion joint. These rigid side plates are designed to take up extrusion of the expansion joint material, eliminating any possible oozing over the top of the concrete pavement slab. Also provides a rigid support during installation.

THIS METAL HOUSING is for the fibrated asphaltic joint and controls oozing of upper structure. The base is prepared from a non-oozing material.

WIRE DOWEL SUPPORT is another method of rigid support for dowel bars. Note the top and bottom caps to which the wire supports are fastened. These caps provide a water seal for both the top and bottom of the concrete slab.

SERVICISED PRODUCTS CORP., 6043 W. 65th St., Chicago, Ill.

Laying 2.57 Miles of Concrete in Ill.

(Continued from page 26)

emptied by three men perched high above the dusty grade on a platform festooned with burlap to try to keep off the torrid sun of the summer of 1936, drove on to the paver where an efficient skip boss spotted them and dumped the batches. Even though the specifications called for the wetting of the grade to be done six hours ahead of paving, it was absolutely necessary again to sprinkle the grade lightly just ahead of the paver as the heat of the sun had dried it out. After a 60-second mix in the Koehring 27E paver, the operator spread the batch accurately for the three puddlers, minimizing their labors. A vibrator man used a Jackson electric vibrator along both edges and on both sides of all joints, which kept him busy as the joints bobbed up every 30 feet with the two contraction joints and then an expansion joint. He also was required to vibrate both sides of the center joint.

The new adjustable screed that had been purchased to try out on the Lakewood finishing machine did not work out to the satisfaction of either the engineers or the contractor as the transition from crown to a flat surface on the approach of a super-elevated curve was not smooth. This led the mechanical genius of the organization, Roy Blackwell, again to devise an adjustable screed that would give a smooth transition from a crown to a plane surface. The method is extremely simple. Attached to the base of the screed and about 6 inches from the front are a series of eyes in which cams are inserted and attached to a shaft running the entire length of the screed. The cams are so bored off center that a turn of 90 degrees will shift the periphery of the cam the required amount to change the attached portion of the screed from its position for screeding a crown to a plane surface. This is accomplished by a hand wheel set on top of the screed at the center. Thus when it is desired slowly to change the crown to the plane section it is necessary only to turn the hand wheel the proper amount every few feet that the screed moves ahead and thus the warped plane will be secured without trouble.

Following the finishing machine, two men sweat hard handling the bull-float which was 12 feet long and operated from a double rolling bridge. These same men also set the bent bars at the edge for tying the slab to the gutter when that was poured later. These same finishers then went back and used the 10-foot Cleveland aluminum straight-edge to drag the surface, followed by a 4-foot float of 6 x 1-inch plank where the slab showed high or low spots. Then the slab was checked with the same straight-edge and if found satisfactory it was immediately surfaced with a 10-inch belt and then the broom finish applied with a Bassine broom and the slab edged. One finisher edged the joints, using a ¼ x 1-inch steel strip as a straight-edge on the expansion joints. A special edging tool designed for these joints was used. It has a 2½-inch plane surface for the top and the curved section is a ½-inch radius cut off ¼ inch below the top.

Curing the Slab

The 20-foot section of slab was cured by placing 9-foot strips of wet burlap across the entire pavement from a bridge rolling on the forms. Three men handled this work, including the sprinkling for a full 24 hours. They then removed the burlap while the inspector checked the slab for smoothness and then applied over the surface the 2¼ pounds of Solvay calcium chloride per square yard with a Thompson spreader such as is used for lime on the farm. These same men also pulled the forms and loaded them for hauling ahead.

The shoulder crew later bladed the earth from the shoulder against the edge of the slab.

Water Supply

The water for the mixer, for sprinkling the grade and wetting the burlap was taken from the city water mains and pumped to a 2½-inch pipe line laid along the south shoulder by a C. H. & E. triplex pump. The valves for the paver were set in the line every 180 feet and the sprinkling taps every 180 feet. The paver carried 150 feet of 2-inch hose and the sprinkling hose totaled 350 feet on the job. The hose from the line across the shoulder used for hauling was carried on a boom attached to the paver.

Personnel

For the contractor, the Blackwell Corp. of East St. Louis, Ill., this $246,401.72 contract for PWS Project 8874, Section 29-R was in charge of R. J. Moore as Manager and A. P. Moore as Superintendent. For the Illinois Division of Highways, the work was in charge of J. K. Langford, Resident Engineer.

Engineering Products for Tropical Service

A unique effort to bring together in one place engineering and other products for making the tropics livable and productive has been announced by the Leipzig Fair. The reclamation of tropical areas is recognized as one of the greatest engineering problems of the world today. If the ingenuity displayed in making cold countries comfortable was directed to making the tropics livable and productive, the problem of over-crowding the earth would be solved. To illustrate the progress along these lines, a special Tropical Engineering Fair has been organized to include large scale displays and demonstrations of all forms of machinery, tools, apparatus and appliances, together with chemical and pharmaceutical products, suitable for tropical climates.

The Fair, to be held in Leipzig from February 28 to March 8, will be attended by representatives of tropical countries prepared to barter raw materials for industrial finished products. Information may be secured from Leipzig Trade Fair, Inc., 10 East 40th St., New York City.

Ventilation Tubing For Tunnel Contracts

The ventilation of rock tunnels during construction is an important contribution to safety and speed. Flexible ducts for conducting fresh air to the face are now quite generally used. American Brattice Cloth Co., Warsaw, Ind., manufactures a flexible blower pipe known as MineVent with demountable couplings which contain no threads or screws and produce an airtight connection. There is no inside obstruction to retard the passage of air and they are equipped with four suspension hooks to prevent sagging of the tubing line and for support in four directions for either vertical or horizontal suspension. The couplings are made of non-rusting metal and can be used separately to repair the flexible tubing and thereby make torn or odd lengths usable without sewing.

The fabric of the tubing is specially treated to reduce frictional resistance to a minimum and is airtight to prevent the escape of air around joints. It is light in weight and comes in tight rolls which can be easily carried forward in the tunnel. The tubing can be rotated in the patented coupling to the proper position, so that it is never twisted. All seams are sewn with extra strong linen thread specially treated and waterproofed for tunnel work.

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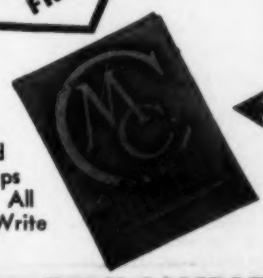

A complete line of modernized equipment for 1937—New CMC Mixers—all sizes. "Dumpover" Pneumatic Tired Concrete Carts—Hoists—Pumps—Saw Rigs—Wheelbarrows. All engineered for faster work. Write for prices.

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Bulletins and Pamphlets

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Bituminous Power Distributors

951 The new Models FC and FX truck-mounted pressure bituminous distributors made by E. D. Etnyre & Co., Oregon, Ill., are described and illustrated in a very complete catalog, No. 506, which may be secured gratis by any official or contractor interested in the efficient, economical and accurate distribution of asphalt, road-oil, tar products and asphalt emulsion in street and highway construction.

Motorized Single Rollers for Patching

952 The new motorized Wheeled Roller made by the Wheeled Roller Corp., San Antonio, Texas, which gives a compression of 135 pounds per inch of contact, is described and illustrated in its many varied applications in a new circular which may be secured direct from the manufacturer.

A New Fast ¾-Yard Shovel

953 The new Northwest Model 25 ¾-yard shovel, with gasoline, diesel or electric power, has fast dipper action, fast swing, simple, easy control, power and stability, according to the manufacturer, the Northwest Engineering Co., 1730 Steger Bldg., 28 E. Jackson Blvd., Chicago, Ill., which will be glad to send complete details on request.

Straight-Line Aggregate Plants

954 The Iowa Super Straight-Line aggregate handling plant, as well as a variety of sizes and styles of other straight-line plants for crushing, washing and screening aggregates on the job, is described in a new folder which the Iowa Mfg. Co., Cedar Rapids, Iowa, will be glad to send on request.

Dirt Moving or Snow Removal

955 The Le Tourneau Angledozer, a heavy-duty bulldozing blade which is equally suitable for clearing roads or trails through rough terrain, dirt moving and spreading, or for clearing roads of snow drifts during the winter months, is described and illustrated in literature which may be secured free on request from R. G. Le Tourneau, Inc., Peoria, Ill., and Stockton, Calif.

Portable Asphalt Plants

956 Bulletin T-248, describing Hetherington & Berner tower-type asphalt plants for hot or cold mix, may be secured by those interested from Hetherington & Berner, Inc., Indianapolis, Ind.

Power Take-Offs

957 Hercules Steel Products Co., Galion, Ohio, will be glad to send to those interested complete information on Hercules split-shaft power take-offs which are installed in the drive shaft of any truck for the operation of any portable equipment.

Road Building and Maintenance

958 Rome high-lift and motor graders for road building and maintenance jobs are described in literature which interested contractors and state and county highway engineers may secure upon request from the Rome Grader & Machinery Corp., Rome, N. Y.

Expansion Joints and Dowels

959 American Concrete Expansion Joint Co., 221 N. LaSalle St., Chicago, Ill., will be glad to send its literature on Ace expansion joints of all types and J-Bars for tying concrete slabs together across expansion joints.

SEND THIS BACK—WE'LL DO THE REST

CONTRACTORS and ENGINEERS MONTHLY
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Lubricating Diesel Engines

960 Complete information on Ten-ol, a special alloyed lubricating oil developed for diesel engines, as well as on Sinclair diesel fuel and other products, may be secured by those interested direct from the Sinclair Refining Co., 630 Fifth Ave., New York City.

Joint Installing Machines

961 Complete information on Flex-Plane contraction joint installing machines and finishing machines may be secured by interested contractors and engineers direct from the Flexible Road Joint Machine Co., Warren, Ohio.

Handling Ready-Mixed Concrete

962 A new booklet "Rex Moto-Mixers and Agitators" describing Rex truck mixers and agitators for preparing and delivering ready-mixed concrete for construction projects may be secured by interested contractors and engineers direct from the Chain Belt Co., 1666 West Bruce St., Milwaukee, Wis.

Rear-Dumping Wagon Scrapers

963 Continental Roll & Steel Foundry Co., Tractor Equipment Div., East Chicago, Ind., will be glad to send to those interested complete information on Continental wagon scrapers which are made in 5, 7 and 10-yard sizes for use with all sizes of crawler tractors, features of which are the Continental patented front apron forming a part of the carrying bucket and its rear-dumping for backfilling over a bank or fill.

New Booklet on Truck Batteries

964 A new 24-page booklet on the Goodrich line of batteries for light and heavy-duty trucks, tractors and buses, a feature of which is the new Kathanode construction, and which contains considerable data on battery power requirements and battery replacement, may be secured by interested contractors and other owners of truck and tractor fleets direct from the B. F. Goodrich Co., Akron, Ohio.

Selecting a Distributor

965 The seven reasons why a contractor, county engineer or state highway engineer can profitably purchase a Kinney distributor are told in Bulletin A which may be secured from the Kinney Mfg. Co., 3529-41 Washington St., Boston, Mass. Kinney distributors have been on the market longer than any other.

Pocket Catalog of Concrete Machinery

966 A very complete, condensed pocket-edition catalog, describing and illustrating the complete Ransome line of concrete machinery, including mixers, pavers, mechanical strike-off machines, tunnel forms, masts and chuting equipment, hoist buckets and bins, pneumatic placers and grouters, hoppers, concrete carts, etc., has just been issued by the Ransome Concrete Machinery Co., Dunellen, N. J. Copies of this Bulletin No. 134 may be secured by writing direct to the company and mentioning Contractors and Engineers Monthly.

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MARLOW PUMPS
Ridgewood, N. J.

JACK FROST won't even slow them down

Compressors left out in winter need lubricants with a low pour point. Texaco Compressor Oils are free-flowing at zero temperatures, yet provide high lubricating efficiency.

Air tools aren't sluggish for long—even on coldest mornings—when lubricated with Texaco Lubricants.

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Nation-wide distribution facilities assure prompt delivery

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TEXACO *Industrial Lubricants*

Bulletins and Pamphlets

(Continued from preceding page)

Lubricating Gears, Chains, Wire Rope

967 The Texas Co., 135 East 42nd St., New York City, has issued a helpful 32-page booklet on Texaco Crater Compound which has been so successful in the lubrication of gears, chains and wire rope. The booklet describes the different types of equipment wherein the various grades of Texaco Crater Compound are used with benefit to the equipment.

Snow-Fighting Equipment

968 Complete information on the Walter Snow Fighter, consisting of a Walter four-wheel-drive motor truck and a V-type snow plow, which may be removed during the summer to free the truck for other service, may be secured by interested state and county highway engineers from the Walter Motor Truck Co., 1001-19 Irving Ave., Ridgewood, Queens, L. I., N. Y.

Contractors' Chains

969 Information on all kinds of heavy chains for contractors' use on equipment and for "snaking" may be secured by those interested from the Carroll Chain Co., Columbus, Ohio.

New Features of Road Roller

970 The new 1937 features of the Huber road roller, which is made in seven sizes of 5, 6, 7, 8, 10, 12 and 14 tons, are described in literature which the Huber Mfg. Co., Marion, Ohio, will be glad to send on request.

New 1937 Motor Trucks

971 Complete information on the 1937 line of GMC trucks, including cab-over-engine models ranging in capacity up to 12 tons, may be secured by interested contractors and state and county highway engineers from the General Motors Truck Co., Pontiac, Mich.

Daylight Conditions for Night Work

972 Literature on the V-G carbide light which gives daylight conditions on night jobs and spreads a full even beam of 8,000 candlepower where it is needed, may be secured by interested contractors and state and county highway engineers from the National Carbide Corp., Lincoln Bldg., New York City.

Diesel Engine Can Be Cranked By Hand

973 International Harvester Co., Inc., 606 So. Michigan Ave., Chicago, Ill., will be glad to send to those interested complete information on its PD-80 6-cylinder diesel power unit, which starts as a conventional gasoline engine and is as easy to crank as any gas engine of its size, and then is easily converted to full diesel operation by turning a conveniently-placed crank.

Extra-Service Wire Rope

974 Complete information on Williamsport Purple Strand Form-Set wire rope, which is marked by the Telfax system to indicate the grade and insure the user's getting the proper grade for his particular service may be secured direct from the Williamsport Wire Rope Co., 122 So. Michigan Ave., Chicago, Ill.

New Bulletin on 1-Yard Excavator

975 Bulletin X-11, describing the general features and specifications of the P & H Model 455 1-yard Pacemaker excavator, which has just been published, may be secured by those interested direct from the Harnischfeger Corp., 4419 W. National Ave., Milwaukee, Wis.

Truck-Mounted Air Compressors

976 The LeRoi-Rix truck-mounted two-stage air compressor which is compactly built to occupy a minimum of space on the truck chassis, leaving ample room for the transportation of men or materials, is described in literature which the LeRoi Co., Milwaukee, Wis., will be glad to send on request.

A New Center-Control Grader

977 Complete information on the new Warco motor graders, features of which are ample power, grip-like traction, and easy and positive manipulation, may be secured by interested contractors and state and county highway engineers from the W. A. Riddell Corp., Bucyrus, Ohio.

Low-Cost Power

978 K. R. Wilson, 21 Lock St., Buffalo, N. Y., will be glad to send to those interested complete information on KRW Ford V-8 power units, which are compact, portable, and suitable for welders, compressors, pumps, hoists and similar equipment.

Two New 1937 Truck Models

979 The Ford Motor Co., Dearborn, Mich., has announced two 1937 V-8 engine sizes, an 85-hp unit for high speeds or heavy duty and a 60-hp unit for light service, offering a choice of power to fit your needs. Complete details may be secured direct from the manufacturer.

All Types of Concrete Vibrators

980 Mall Tool Co., 7743 So. Chicago Ave., Chicago, Ill., will be glad to send on request complete information on the Mall line of concrete vibrators, with gas engine, air or electric power, in large sizes for placing mass concrete in piers, pavements, and concrete deck slabs, medium sizes for average concrete walls and small sizes for heavily-reinforced structures.

A 3-Speed Hand Winch

981 Ramsey Machinery Co., Portland, Ore., will be glad to send to those interested complete information on Ramsey all-steel 3-speed hand winches, in two sizes of 3 and 5-ton capacity, with speeds of 25 to 1, 4 to 1 and 1 to 1.

Road Roller with Third Roll

982 The Hercules Ironer Roll and the results secured with this road roller which also has a scarifier attachment are described in a circular entitled "The Reasons Why" which may be secured upon request from the Hercules Co., Marion, Ohio.

Shovels, Cranes and Draglines

983 Complete information on the Lima line of shovels, cranes and draglines in sizes from ¾ to 2½ yards and the 3-yard Lima dragline, features of which are their power, speed and endurance, may be secured upon request from the Lima Locomotive Works, Inc., Shovel and Crane Division, Lima, Ohio.

Tractors for Construction Jobs

984 Cleveland Tractor Co., Cleveland, Ohio, will be glad to send to interested contractors and state and county highway engineers complete details on Cletrac crawler tractors which for more than 20 years have been used for dirt moving and construction.

Oil-Burning Tar Kettles

985 White fireproof oil-burning tar kettles, in a variety of sizes with hand or motor-driven sprays, are described in literature which the White Mfg. Co., Elkhart, Ind., will be glad to send on request.

Detachable Bits for Rock Drilling

986 Ingersoll-Rand Co., 11 Broadway, New York City, has just issued a new booklet, Form 2304, covering the characteristics and uses of Jackbits for drilling rock. This booklet also gives dimensions and prices of Jackbits and Jackrods. A copy may be secured by writing direct to Ingersoll-Rand.

A Compact, Powerful Hand Hoist

987 Beebe Bros., 2724 6th Ave. So., Seattle, Wash., will be glad to send to those interested complete information on Beebe all-steel hand hoists which are manufactured in 2, 5 and 15-ton sizes, with gear ratios of 4 and 22 to 1, 4 and 24 to 1, and 4, 19 and 109 to 1, respectively.

Pocket Size Handbook on Pumps

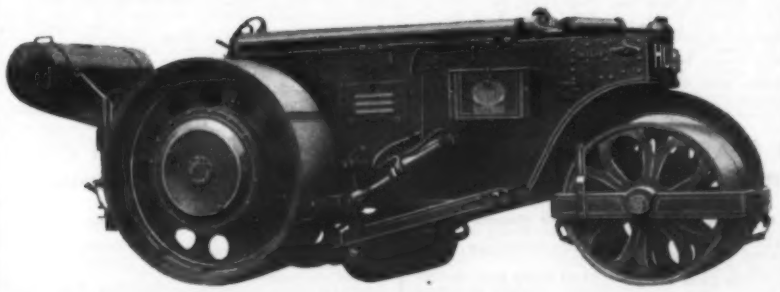
988 Economy Pumping Machinery Co., 3431 West 48th Place, Chicago, Ill., has just issued a new "Pump Data" handbook for 1937 covering a wide field of pumping applications. It is divided into two sections, the first on pump prices, applications and installation data, and the second devoted to engineering data invaluable to either designer or operating engineer. Copies of this handbook may be secured free by readers of CONTRACTORS & ENGINEERS MONTHLY writing on their company or official letterhead.

For Long Service . . .

HUBER

"TRU-PLANE"

MOTOR ROLLERS



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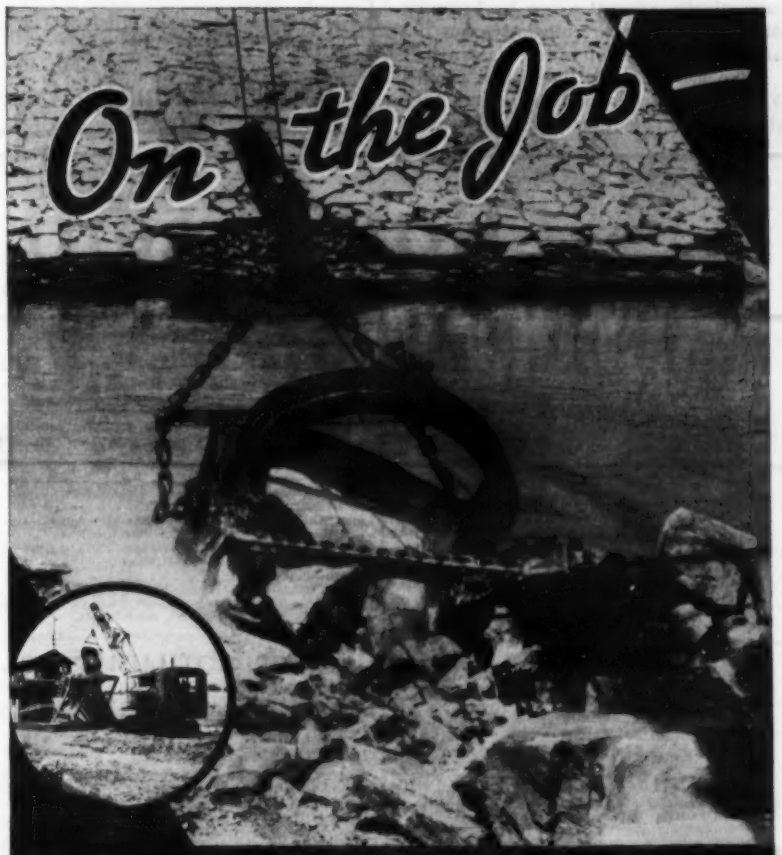

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Users Report Their Results With the Patented Rounded Front AUTOMATIC:-

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"Has increased our production at least 75%. To us, the Page Automatic is the only bucket for dragline work."
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"Last winter we purchased an 8-cy Automatic. It has increased our yardage, enabled us to dig harder burden that we could not dig before."
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(*From letters in our files)

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CLEARING POST OFFICE CHICAGO, ILLINOIS

No Accidents Last Year on Lighted Tacoma Highway

The Washington State Highway Department reports an enviable night-safety record during 1936 for the 2.9-mile stretch of Pacific Highway south of Tacoma, which it lighted with sodium safety lamps in December, 1935, as described in the June, 1936, issue of CONTRACTORS AND ENGINEERS MONTHLY, page 1. No night accident has occurred on the stretch during the past year, according to reports from L. V. Morrow, Director of the department.

"This record speaks particularly well for the efficiency of the lights when it is taken into consideration that 20 per cent of the installation is through a section which is built up immediately adjacent to the highway with fruit stands, produce markets and small restaurants," Director Morrow states. "At all hours of the day and a major portion of the night, but more particularly between the hours of 5 and 7 p.m., a large number of vehicles are leaving these places of business. The lights seems to have been particularly advantageous in bringing into view a vehicle entering upon the main traveled portion of the highway.

"The use of these lights has proved to be very effective during heavy fogs which are prevalent throughout this area, and also during the other times when storms have been encountered. From the results obtained by this installation it is indicated that a much greater degree of safety is afforded the traveling public by such lighting."

Since the section of Pacific Highway which is lighted was newly constructed at the time of the installation, and had not been used by motor vehicles previously, comparative figures on the number of accidents before and after lighting are not available. The Pacific Highway installation was made by the General Electric Co.

District Sales Manager of Link-Belt at St. Louis

Link-Belt Co., Chicago, Ill., has announced the appointment of Erwin A. Wendell as District Sales Manager with headquarters at 317 N. 11th St., St. Louis, Mo. Mr. Wendell has been connected with the Link-Belt Pershing Road Plant in Chicago since 1918 and for a number of years has served as sales engineer in metropolitan Chicago. In his new position, he succeeds Howard L. Purdon, who has been transferred to the company's Chicago plant to assume sales responsibilities in the Chicago territory.

RAMSEY ALL-STEEL 3-SPEED HAND WINCH

25 to 1—4 to 1—1 to 1

2 Sizes

Capacity	Weight	Cable Cap	Price
5-Ton	135 lbs.	325' 1/2"	$75.00
3-Ton	75 lbs.	150' 1/2"	$55.00

Sold by Machinery Dealers in principal cities
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Clyde Hoists, Derricks
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Gar Wood Hydraulic Scrapers
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PAGE—Dragline Buckets
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UNIVERSAL—Crushers, Pulverizers
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MASTER—Vibrators, Generators, Arc Welders
SULLIVAN—Air Compressors, Tools
TRACKSON—Crawlers, Shovels and Bulldozers
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Caterpillar Tractor Co.—Tractors, graders, road machinery
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Killefer Mfg. Corp.—Road and farm tools
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Page Engineering Co.
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make this Directory of Dealers in construction equipment the most complete and accurate of its kind. Therefore, we would greatly apreciate any suggestions or corrections that you may have to offer.

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Domestic Eng. & Pump Co.
Dobbie Fdry. & Mach. Co.
Duff-Norton Mfg. Co.
Galion Iron Wks. & Mfg. Co.
A. B. Farquhar Co., Ltd.
Harrington Co.
Ingersoll-Rand Co.
A. Leschen & Sons Rope Co.
Lidgerwood Mfg. Co.
Pierce Equip. Co.
Pulsometer Steam Pump Co.
Ransome Concrete Mashy. Co.
Richmond Screw Anchor Co.
Sterling Wheelbarrow Co.
Templeton, Kenly & Co.
Union Iron Works
Universal Road Mashy. Co.

Member: Associated Equipment Distributors

LANGE TRACTOR & EQ. CO.

304 Lake Ave., S. Duluth, Minn.

Caterpillar Road Machinery and Tractors
LaPlant-Choate Wagons, Bulldozers, Snow Plows, Scrapers
Killefer Scrapers, Road Discs, Rippers
Davey Air Compressors
Cleveland Rock Drills
Ames Baldwin Wyoming Hand Shovels
Hansen Trailers
Williamette-Hyster Hoists and Winches
Wausau Tractor and Truck Snow Plows
Davenport Gas and Diesel Locomotives
Oshkosh 4-Whl. Drive Trucks
Anthony Power Loaders
MacWhyte Wire Rope
LeTourneau Contrs. Equip.
Speeder Shovels
Athey Crawler Wagons
Elgin Street Sweepers

Member: Associated Equipment Distributors

CORBY SUPPLY COMPANY

3942-46 W. Pine Blvd., St. Louis, Mo.

Representing

AMERICAN—Flexible Metal Hose
BUHL CO.—Portable Air Compressors
CHAMPION RIVET CO.—Rivets and Welding Rod
DETROIT HOIST & MACH. CO.—Air and Electric Hoists
DeVILBISS CO.—Paint Spray Equipment
HARDSOCG WONDER DRILL CO.—Rock Drills and Paving Breakers
WM. H. KELLER, INC.—Super Pneumatic Tools
MUNSELL—Air-Operated Concrete Vibrators
PANGBORN CORP.—Sandblast Equipment
PENNSYLVANIA—Air Compressors and Pumps
DAVID ROUND & SON—Chain Hoists
STAYNEW—Air and Pipeline Filters
N. A. STRAND & CO.—Flexible Shaft Equipment
VAN DORN—Electric Drills, Grinders and Buffers
VICTOR—Welding and Cutting Apparatus
WESTINGHOUSE—Arc Welding Equipment
GUSTAV WIEDEKE CO.—Tube Expanders

HENRY A. PETTER SUPPLY COMPANY

Paducah Kentucky

Alemite Equipment
American Wire Rope, Mesh
Bates Bar Ties
Bates Tractors
Beebe Hand Hoists
Black & Decker Tools
Cedar Rapids Crushers
Chain Belt (Rex) Mixers
D-A Lubricants
DuPont Explosives
Dobbie Derricks
Elastite Expansion Joint
Euclid Scrapers
Farquhar Engines, Boilers
General Electric Motors
Gulf States Reinforcing Steel
Hansen Excavators
Hauck Heaters and Thawers
Johnson Bins and Hoppers
LeRoi Gas Engines
Lidgerwood Hoisting Machy.
Link-Belt Cranes, Shovels
Nove Pumps and Hoists
Oswald Apparatus
Page Buckets
Portable Conveying Machinery
Rogers Bros. Trailers
Saugen Derricks
Sauerman Scrapers
Shunk Grader Blades
Toledo Torches
Trackson Tractors
Universal Concr. Accessories
Vulcan Pile Equipment
Wehr Graders
Western Road Machinery
Worthington Pumps
Wyoming Shovels

CLARK-WILCOX COMPANY

790-798 Albany St. Boston, Mass.

Representing

RANSOME—Concrete Mixers, Chuting Equip.
NORTHWEST—Cranes, Shovels, Draglines
BLAW-KNOX—Steel Forms, Bins, Buckets, "Ord" Finishers
CARTER—"Humdinger" Pumps
INGERSOLL-RAND—Air Compressors
ORR-SEMBOWER—Hoists, Boilers, Mixers
HAUCK—Oil Burners and Heaters
HAISS—Elevators, Conveyors and Loaders
ALLIS-CHALMERS—Tractors
BAKER—Bulldozers
BEEBE BROS.—Hoists
CLEVELAND—Formgraders
C. R. JAHN CO.—Trailers
BURCH—Ross Plows, Road Machinery
HOMESTEAD—Hypressure Jenny Cleaner
G. H. & E.—Pumps, Saw Tables, Hoists
PIERCE—Rollers
COMPLETE—Wellpoints
BLYSTONE—Mortar Mixers

Member: Associated Equipment Distributors

THORMAN W. ROSHOLT CO.

3138 Snelling Ave. Minneapolis, Minn.

Representing

IOWA "Cedar Rapids" Crusher Plants and Equip.
KOEHRING Pavers, Mixers, Cranes, Dumptor, Mud-Jacks, Shovels
RAMSEY Hoists and Winches
CHICAGO Pneumatic Compressors and Tools
McCORMICK-DEERING Industrial Tractors
KWIK-MIX Mixers
RIDDELL Power Grader
JOHNSON Batchers and Demountable Bins
TRACKSON Loaders and Cranes
BYERS Shovels and Cranes
VULCAN Steam and Gas Locomotives
LIDGERWOOD Hoists
BARGENT Snow Plows
METAL FORMS CORP. Steel Forms
ROSCO Trailers and Bituminous Distributors
STOCKLAND Graders
WALTER Trucks
GORMAN-RUPP CO. Pumps
UNION IRON WORKS
WHEELED Rollers
BUFFALO-SPRINGFIELD Rollers
MARTER Vibrators
OWEN Buckets
BEACH Saws
CLEAVER-BROOKS Boilers

Member: Associated Equipment Distributors

JOHN FABICK TRACTOR CO.

Gravois & Iowa Aves. St. Louis, Mo.

Representing

Athey Truss Wheel Co.
Blaw-Knox Company
Buffalo-Springfield Roller Co.
Caterpillar Tractor Co.
Killefer Mfg. Co.
LaPlant-Choate Mfg. Co.
Pioneer Gravel Equip. Mfg. Co.
Thew Shovel Company
Willamette-Hyster Co.
R. G. LeTourneau, Inc.
Ramsey Machinery Co.

Member: Associated Equipment Distributors

Equitable Equipment Co., Inc.

410 Camp Street New Orleans, La.

BROWNING Cranes and Shovels
CAMERON Pumps
CEMENT GUN Guniting and Equipment
CUMMINS Diesel Engines
DEAN BROS. Steam and Power Pumps
DIXIE Crushing, Pulv. Machy.
GENERAL ELECTRIC Motors, Arc Welders, etc.
HYDROIL Goulds Oil Purifiers
INGERSOLL-RAND Air Compressors, Pneu. Tools, Pumps, Engines
HERRELL Pipe Machines
MOORE Steam Turbines, Reduction Gears
MORRIS Dredging Machy.
MUNDY Hoisting Engines
NOVO Engines, Hoists, Pumps
PLYMOUTH Gas and Diesel Locomotives
RAMSEY Winches, Hoists
SHAW BOX Hoists, Cranes
SMITH Concrete Mixers
TROY-ENGBERG Generators, Steam Engines
WEIR-KILBY Frogs and Switches
WELDED Tanks, Pipe Barges, Pontoons
WELDING Rods and Equipment

THE EQUIPMENT CO.

30 Prentiss St. Boston, Mass.

Representing

Link-Belt Cranes and Shovels

Ingersoll-Rand Compressors and Tools

"Williams" Buckets and Trailers

Homelite Pumps and Generators

COMPLETE RENTAL SERVICE

Member: Associated Equipment Distributors

WM. H. ZIEGLER CO., INC.

Minneapolis, St. Paul, Duluth, Crookston, Minn.; Glasgow, Mont.

"CATERPILLAR" — Tractors, Engines, Road Machinery
LAPLANT-CHOATE—Bulldozers, Snow Plows, Dump Wagons
LeTOURNEAU—Dirt Moving, Road Equipment
KILLEFER—Road Rippers, Scrapers
ATHEY—Crawlers, Dump Wagons, Trailers
BUCYRUS-ERIE — Power Shovels, Cranes, Draglines
PIONEER—Crushers, Gravel Plants
REX—Mixers, Pavers, Mo-to-Mixers, Pumps, Saw Rigs
BUTLER—Bins, Batchers
BARBER-GREENE — Conveyors, Loaders, Ditchers
F. W. D.—Four-Wheel Drive Trucks
PLYMOUTH—Locomotives
GARDNER-DENVER—Air Compressors, Drills
LESCHEN—Wire Rope
LITTLEFORD — Oil Distributors, Tar Kettles, Heaters
"WILLIAMS" — Buckets, Heavy-Duty Trailers
HYPRESSURE JENNY—Spray Cleaners
MADSEN—Asphalt Plants

Member: Associated Equipment Distributors

JOSEPH KESL TRACTOR & EQUIP. CO.

1510 North 13th St. St. Louis, Mo.

Allis-Chalmers Mfg. Co.
The Baker Mfg. Co.
Continental Roll & Steel Foundry Co.
Wm. Bros Boiler & Equip. Co.
Gardner-Denver Co.
General Wheelbarrow Co.
Toledo Pressed Steel Co.
Contractors Machinery Corp.
Diamond Iron Works, Inc.
Orr & Sembower, Inc.
Construction Machy. Co.
Fairbanks, Morse & Co.
Amos Baldwin Wyoming Shovel Co.
Aeroil Burner Co.
Bucyrus-Erie Co.
C. H. & E. Mfg. Co.
Gar Wood Industries Inc.
Klein-Logan Co.
Page Engineering Co.
St. Louis Steel Products Co.
Saugen Derrick Co.
Slusser-McLean Co.
Trackson Co.
Vulcan Iron Works

Member: Associated Equipment Distributors

C. F. RABBEITT, INC.

1523 N. Broadway St. Louis, Mo.

Representing

Cleveland Formgrader Co.
Cleaver-Brooks Co.
Huber Mfg. Co.
Insley Mfg. Co.
Koehring Co.
Kwik-Mix Mixer Co.
Lidgerwood Mfg. Co.
Butler Bin Co.
Frank G. Hough Co.
Metal Forms Corp.
Sterling Machinery Corp.
Butler Bin Co.
Drave-Doyle Co.
Flynn Mfg. Co.
Fairbanks-Morse & Co.
Master Vibrator Co.
Northern Conveyor Co.
Sterling Wheelbarrow Co.
The Parsons Co.

Member: Associated Equipment Distributors

JOHNSON & DEALAMAN, INC.

60 Marshall Street Newark, N. J.

Representing

RANSOME Pavers, Mixers, Chuting Equipment
SCHRAMM Air Compressors, Tools
ALLIS-CHALMERS Tractors, Graders
JOHNSON Steel Bins and Batchers
ERIE Gasoline Rollers
MARLOW Centrifugal, Diaphragm and Plunger Pumps
ETNYRE Tar and Asphalt Distributors
WILLIAMS Trailers and Buckets
RED STAR Wheelbarrows, Batch Boxes, Column Clamps and Adjustable Shores
OSGOOD Shovels, Cranes and Draglines
GENERAL Shovels, Cranes and Draglines
HOTCHKISS Road and Sidewalk Forms
VIBRO-CAST & JACKSON Concrete Vibrators and Elec. Power Plants
AMERICAN Snow Plows
HY-WAY Spreaders

GEORGE MALVESE & CO.

New Hyde Park, N. Y.

Long Island Distributors:

CLETRAC Crawler Tractors
"SILVER KING" Tractors
ADAMS Graders
SARGENT Snow Plows
LOCKE Power Mowers
EUCLID Scrapers
OLIVER Implements
BRODERICK & BASCOM Wire Rope

WORTHINGTON Power Mowers

Also Pumps, Mixers

N. P. WALTON, JR.

39 Cortlandt Street New York, N. Y.

Representing

JAEGER MACH. CO.—Truck Mixers, Finishing Machines, Road Forms, Spreaders
D. C. ELPHINSTONE, INC.—"BEST" Stone and Chip Spreaders
ERIE STEEL CONSTRUCTION CO.—All-Steel Bins, Complete Aggremeter Plants, Erie Buckets, Clamshell, Dragline and Electric
IOWA MFG. CO.—"CEDAR RAPIDS" Crushers, Material Handl. Equip.; Sand, Gravel and Asphalt Plants
THE KRON CO.—Full-capacity Springless Dial Scales
HANDY SACK BALER CO.—Cement Sack Cleaners, Balers

THE GEO. F. SMITH CO.

Franklin & Channing Aves., St. Louis, Mo.

Complete Plants Rented

Ingersoll-Rand—Compressors, Air Tools
Clyde—Hoists and Derricks
Owen—Clamshell Buckets
Hauck—Heaters
Sauger—Derricks & Winches
Skilsaw—Electric Saws, Drills
Skeltan—Shovels
LeRoi—Engines
Symons—Column Clamps
Winslow—Weighing Scales
Universal—Form Clamps
Link-Belt—Cranes, Shovels, Draglines
Novo—Pumps
Vulcan—Steam and Drop Hammers
Waukesha—Engines
Mall—Vibrators and Grinders
Archer—Tower Equipment
Red Star—Wheelbarrows and Shores
Templeton, Kenly & Co.—Trench Braces, Jacks
Smith—Mixers, Pavers
Vail—Tie Wires and Tools
American Steel & Wire—Rope

Member: Associated Equipment Distributors

CONTRACTORS WHITE SALES CORP.

P. O. Box 949 Albany, N.Y.

Representing

Allis-Chalmers Mfg. Co.—Tractors, Road Machy.
Jaeger Machine Co.
General Excavator Co.
Link-Belt Co.
Baker Mfg. Co., Inc.
Huber Mfg. Co.
Hough Universal Sweepers
Ingersoll-Rand Co.

R. E. BROOKS COMPANY

"Serving the Contractor for over 25 years"

50 Church Street New York, N.Y.

Beach Mfg. Co.—Saw Rigs
Blaw-Knox Co.—Road and Sidewalk Forms, Bins, Batchers, Finishing Machines, Spreaders, Buckets
Cleaver-Brooks Co.—Tank Car Heaters, Boosters
Gorman-Rupp Co.—Pumps
Hug Co.—Trucks
Insley Mfg. Co.—Excavators, Concrete Chuting Plants, Buckets, Cars
Koehring Company—Pavers, Mixers, Shovels, Cranes, Mud Jacks
Kwik-Mix Mfg. Co.—Concr. Mixers
Master Vibrator Co.—Concr. Vibrators
Parsons Co.—Trench Machines
Pioneer Gravel Equipment
Rosco Mfg. Co.—Oil Distributors

Member: Associated Equipment Distributors

WE WOULD LIKE TO HAVE YOU HELP US

make this Directory of Dealers in construction equipment the most complete and accurate of its kind. Therefore, we would greatly appreciate any suggestions or corrections that you may have to offer.

CONTRACTORS AND ENGINEERS MONTHLY

470 Fourth Avenue New York

CONNELLY MACHINERY CO.

509 No. 27th St. Billings, Mont. — **315 2nd Street So. Great Falls, Mont.**

Distributors of

Caterpillar Tractors, Engines, Road Machinery
Bucyrus-Erie Shovels, Draglines and Cranes
Bucyrus-Erie Loadmasters
Buckeye Ditchers, Backfillers
Buffalo-Springfield Road Rollers
D-A Lubricants, Oils
DeWitt Belting, Hose
Le Tourneau Dirt Moving, Road Bldg. Equip.
Kohler Lighting Plants
LaCrosse Tu-Way Trailers
Hough-Universal Road Sweepers
Standard Paving and Plant-Mix Oiling Plants, Distributors, Trailer Oilers and Retorts
Leschen's Wire Rope
Deere Industrial Tractors
LaPlant-Choate Equipment
Pioneer Gravel Equipment

Tractor-operated Hoists, Scrapers, Dirtmovers, Rippers, Scarifiers, Bulldozers, Trailbuilders, Backfillers, Snow Plows, Loaders, Truck-type and Wheeled Wagons and Trailers, etc.

Member: Associated Equipment Distributors

DOW & COMPANY, INC.

Court & Wilkeson Sts., Buffalo, N.Y.

Exclusive Distributors of

ADAMS—Leaning Wheel Graders
BARCO—Gasoline Hammers
C. H. & E.—Pumps, Hoists, Saw Rigs
CHICAGO PNEUMATIC TOOL CO.—Compressors, Drills
EUCLID—Earth-Moving Equipment
FRINK—Sno Plows
HOUGH-UNIVERSAL—Sweepers
INTERNATIONAL—Tractors & Power Units
MOHAWK—"Hotstuf" Kettles, Burners
T. L. SMITH—Mixers, Pavers, Tower Pavers
THEW-LORAIN—Shovels, Cranes
TONCAN—Corrugated Culverts
UNIVERSAL-LORAIN—Shovels, Truck Cranes
WALTER—Snowfighters, Tractor Trucks
"WILLIAMS"—Buckets, Trailers
WILLIAMSPORT—Wire Rope

Member: Associated Equipment Distributors

A. P. DIENST CO., Inc.

Contractors' Supplies

140th St. & 3rd Ave., New York, N. Y.

Distributors for

GREDAG Grease
TOLEDO Bull Frog Wheelbarrows
WYOMING Red Edge Shovels
DUFF Sewer Trench Braces
CURRY Wire Ties
KEYSTONE Grease

Telephone MOtt Haven 9-5430

THE SYRACUSE SUPPLY CO.

314 W. Fayette St. Syracuse, N. Y.

Warehouse 358 W. Jefferson St.

Atlas Powder Co.
Barber-Greene Co.
Blaw-Knox Co.
Caterpillar Tractor Co.
Centaur Tractor Co.
Clyde Sales Co.
Goodyear Tire & Rubber Co.
Gorman-Rupp Co.
Goulds Pumps, Inc.
Hazard Wire Rope Co.
Ingersoll-Rand Co.
Johns-Manville (Bridge Plank)
Killefer Mfg. Co.
Koehring Co.
LaPlant-Choate Mfg. Co.
Insley Mfg. Co.
Parsons Co.
Rumsey Pump Co.
Universal Form Clamp Co.
Wickwire Spencer Steel Corp.
Williamsport Wire Rope Co.
Timken Roller Bearing Service & Sales Co.—Timken Bits & Rods
Iowa Mfg. Co.
R. G. LeTourneau, Inc.

Member: Associated Equipment Distributors

HALL-PERRY MACHINERY CO.

802-12 E. Iron St., Butte, Mont.

Representing

American Cable Co.
Atlas Imp. Diesel Eng. Co.
Butler Bin Co.
Chain Belt Co.
Chicago Pneumatics Tool Co.
Cleaver-Brooks Co.
Clyde Sales Co.
Coffing Hoist Co.
Columbia Steel Casting Co.
Diamond Iron Works
Elgin Corporation
Euclid Road Machy. Co.
Foote Company
Gallon Iron Wks. & Mfg. Co.
Goodyear Tire & Rubber Co.
Hansen Trailers
Hazard Wire Rope Co.
Jos. F. Kiesler Co.
Madsen Iron Works
Marmon-Herrington Co.
Mohawk Asphalt Heater Co.
Nordberg Manufacturing Co.
Novo Engine Co.
Ohio Valley Pulley Works
Portable Machinery Co.
Ramsey Winches
Rotary Snow Plow Co.
Sauerman Bros., Inc.
Thew Shovel Company
Timken Roller Bearing Co.
Willett Mfg. Co.

Member: Associated Equipment Distributors

LLOYD G. ROSS

3090 Main St. Buffalo, N. Y.

Representing

General Excavator Co.
Hercules Roller Co.

Sale and Rent of All Kinds of Construction Equipment

MAHONEY-CLARKE, INC.

Complete Line of Contractors' Equipment and Supplies.

217 Pearl Street New York, N.Y.

Representing

Riddell Graders
Hercules Road Rollers
Schramm Compressors
Marlow Self-Priming Pumps
Munsell Pneumatic Concrete Vibrators
Cleveland Rock Drills, Pneu. Tools
Vulcan Pile Hammers, Extractors, Parts
Wiley Concrete Buckets
Hotchkiss Road & Sidewalk Forms
Lansing Concrete, Mortar Mixers

Rental Service

NORTH CAROLINA EQ. CO.

P.O. Drawer 426, 3116 Hillsboro St.

RALEIGH, NORTH CAROLINA

Br. Off. & Warehouse—No. 1 London Road Phone 411, Asheville, N. Car.

American Cable Company
Aeroil Burner Company
Buckeye Traction Ditcher Company
Cleveland Rock Drill Co.
Continental Roll & Steel Foundry Co.
Day Pulverizer Company
Euclid Road Machy. Co.
The Four Wh. Dr. Auto Co.
Gallon Iron Wks. & Mfg. Co.
Gallon Allsteel Body Co.
Good Roads Mach. Corp.
Hvass Sales Corp.
Iowa Manufacturing Co.
Internat'l Harvester Co.
Jaeger-Lakewood Company
Jeffrey Manufacturing Co.
The C. S. Johnson Company
Kensington Steel Company
Kinney Manufacturing Co.
Jos. F. Kiesler Company
Miami Trailer & Scraper Co.
Michigan Power Shovel Co.
Northwest Engineering Co.
Page Engineering Company
Rogers Brothers Corp.
Schramm, Inc.
Waukesha Motor Company
Willett Manufacturing Co.
Wheeled Roller Corporation
Elgin Corporation

Member: Associated Equipment Distributors

NORTHWEST EQUIP. CO., Inc.

Box 1112 Great Falls, Mont.

Complete Line of Road Machinery and Contractors' Equipment

Representing

PIONEER Gravel Equip.
KOEHRING Mixers, Pavers, Shovels
INSLEY Conc. Towers
PARSONS Ditchers
PANTHER Oil, Grease
COLEMAN Trucks
OWEN Buckets
SCHRAMM Air Compressors
MacWHYTE Rope
CLEVELAND Rock Drills

Steel Bridges and Traffic Treads, Fresnos, Plows, Scrapers, etc.

EUGENE F. VAN NAME

116 John Street Horseheads, N. Y.

Representing

ALLIS-CHALMERS—Tractors, Graders
A-W—Traffic Tread
BAKER—Road Drags, Snow Plows
C. M. C.—Wonder & Marsh-Capron Mixers
HUBER—Rollers
HOTCHKISS—Sidewalk Forms
HANSON—Excavators
JACKSON—Wheelbarrows
MILES—Concrete Block Machines
THE NORTHERN—Gravel & Coal Conveyors
WILLIAMSPORT—Wire Rope
WISCONSIN SPECIAL—Snow Plows

H. O. PENN MACHY. CO., INC.

140th St. & East River Bronx, N. Y.

Representing

CATERPILLAR Tractors and Accessories
LaPLANT-CHOATE MFG. CO.
ATHEY TRUSS WHEEL CO.
BLAW-KNOX Dirt-Moving Eq.
R. G. LeTOURNEAU, INC.
MARION Shovels, ¾-2 yds.
SPEEDER Shovels, ½-⅝ yd.
DEERE Indus. Tractors
SMITH Mixers, Pavers
LeROI Compressors, Engines
HELTZEL Steel Bins, Forms
FRINK Sno Plows
MARLOW Pumps
KIESLER Buckets

Warehouse Stock—Service Station

Member: Associated Equipment Distributors

CAROLINA TRACTOR & EQUIPMENT COMPANY

S. Main Ext. Salisbury, N. Car.

Branch Office and Warehouse: 733-35 West Hargett St., Raleigh, N. C.

CATERPILLAR Tractors, Graders, Power Units
THEW Shovels, Cranes
LeTOURNEAU Carry-all Scrapers
BLAW-KNOX Steel Forms, Bins, Buckets, Trukmixers
LaPLANT-CHOATE Wagons, Bulldozers
DIAMOND Roll, Jaw Crushers
BARBER-GREENE Conveyors, Car Unloaders
LaCROSSE Trailers
ETNYRE Bituminous Distributors, Flushers
WONDER Mixers, Pumps, Hoists
GARDNER-DENVER Air Compressors, Drills
SLUSSER-MacLEAN Wheelers, Rippers, Fresnos
GORMAN-RUPP Centrifugal Pumps
HERCULES Road Rollers

Member: Associated Equipment Distributors

HEYNIGER BROTHERS

Contractors' Equipment

6th Ave. and F St. Belmar, N. J.

JAEGER Concrete Mixers
JAEGER Placing Plants
AEROIL Torches, Heaters

Steel Sidewalk and Curb Forms
"Mud Hog" Pumps
Material Elevators
Air Compressors
Gasoline Hoists
Trench Pumps
Carbic Lights
Wheelbarrows
Mortar Tubs
Steel Mortar Boxes
Picks and Shovels
Tarpaulins
Scaffold Horses
Electric Drills & Saws
Chain Hoists

JOHN R. TINKLEPAUGH

LIVINGSTON NEW YORK

Representing

Cleveland Tractor Company
Gar Wood Industries, Inc.
York Modern Corporation
Oshkosh Motor Truck Mfg. Co.
Euclid Road Machy. Co.
Killefer Mfg. Co.
Maine Steel Products Co.

JOHN REINER & CO., Inc.

29 Howard St. New York, N. Y.

Representing

NOVO ENGINE CO.—Gasoline Engines
WISCONSIN MOTOR CORP.—Gasoline Engines and Power Units
PERFEX RADIATOR CO.—Radiators
STOVER MFG. & ENGINE CO.—Diesel Engines, Generating Sets
TWIN DISC CLUTCH CO.—Clutches

Telephone CAnal 6-0286

THE BLAISDELL-FOLZ EQUIP. CO.

2143-2147 Barnard St. Cincinnati, Ohio

Representing

Allis-Chalmers Mfg. Co.—Tractors, Road Machinery
Chain Belt Co.—Rex Pavers, Moto-Mixers, Building Mixers and Pumps
Northwest Engineering Co.—Gasoline Shovels, Cranes, Draglines, Pull Shovels
Ingersoll-Rand Co.—Compressors, Pneumatic Tools, Pumps
Clyde Sales Co.—Hoisting Engines, Derricks
Drave-Doyle Co.—American Tubular Towers
Sauerman Bros., Inc.—Cableways, Power Scrapers, Excavators
Universal Crusher Co.—Crushers
The C. S. Johnson Co.—Bins, Batchers
Deister Machine Co.—Plat-O Vibrator Screens
Vulcan Iron Works—Pile Hammers
Wellman Engineering Co.—Clamshell, Dragline Buckets
Sauger Derrick Co.—Derricks

Member: Associated Equipment Distributors

DALE & RANKIN, INC.

113 Frelinghuysen Ave., Newark, N. J.

Representing

HELTZEL Road Forms and Bins
P & H Cranes and Excavating Equipment
P & H Hansen Electric Arc Welders
INGERSOLL-RAND Compressors and Tools
STERLING Wheelbarrows
AEROIL Heaters and Tools
ALEMITE Guns and Fittings
REX Mixers and Pavers
REX Pumps
REX Saw Rigs
UNIVERSAL Concrete Accessories
VIBER Elec. & Pneu. Concrete Vibrators
WINSLOW Scales
WALSH Snow Plows

Member: Associated Equipment Distributors

COMPLETE MACHINERY & EQUIPMENT CO., Inc.

"Specialists in Pumps"

Webster Ave. and Hancock St.

Long Island City New York

Representing

HUMPHREYS MFG. CO.—Diaphram, Plunger and Centrifugal Pumps
INGERSOLL-RAND CO.—Air Compressors
COMPLETE—Wellpoint Systems
KADCO CORP.—Dust Control Equipment
MARLOW—Self-priming Centrifugal & Plunger Pumps
KOEHRING CO.—Concrete Mixers

RENTAL SERVICE

Member: Associated Equipment Distributors

UNITED HOISTING CO., INC.

165 Locust Avenue
NEW YORK, N. Y.

Representing

Construction Machy. Co.—Concrete, Plaster & Mortar Mixers, Saw Rigs, Hoists & Pneu. Tired Concrete Carts
Independent Pneumatic Tool Co.—"Thor" Pneumatic Tools, Hand Saws, and Sump Pumps
Portable Machy. Co.—Portable and Stationary Belt Conveyors
Sterling Machy. Co.—Centrifugal, Diaphragm and Jetting Pumps
Sterling Mfg. Co.—Wheelbarrows & Concrete Carts
Sullivan Machy. Co.—Compressors, Pneumatic Tools and Accessories
White Mfg. Co.—Concrete Vibrators, Grinders and Heaters

Member: Associated Equipment Distributors

THE CLETRAC OHIO SALES CO.

E. 193rd Street and Euclid Ave.

Cleveland Ohio

Representing

THE CLEVELAND TRACTOR CO.—Crawler Tractors
THE DAVEY COMPRESSOR CO.—Air-Cooled Compressors
THE EUCLID ROAD MACHY. CO.—Crawler Wagons, Scrapers
MAIN STEEL PRODUCTS CO.—Snow Plows
D-A LUBRICANT CO.—Oil
THE ROC COMPANY—Winches

LOOK THIS DIRECTORY OVER CAREFULLY

If you find any errors while checking over this directory will you please advise us, because it is our desire to keep it accurate and up to date at all times.

CONTRACTORS AND ENGINEERS MONTHLY

470 Fourth Avenue New York

HOWARD-COOPER CORPORATION

Portland — Seattle — Spokane — Twin Falls

Representing

Internat'l Harvester Co. (McCormick-Deering Industrial Tractors)
Barber-Greene Co.
Cleveland Rock Drill Co.
Marion Steam Shovel Co.
Hughes-Keenan Co.
Cleaver-Brooks Co.
The Jaeger Machine Co.
Nordberg Mfg. Co. (Symons Crushers)
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NOVO Engines, Hoists, Pumps
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CONTRACTORS AND ENGINEERS MONTHLY

470 Fourth Ave. New York

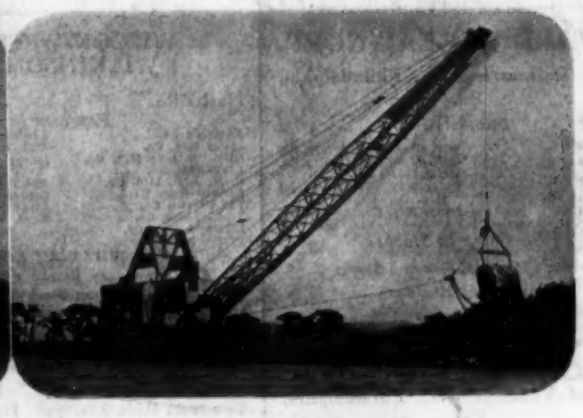
C. & E. M. Photos

The Blackwell Corp. Did Things Differently When It Tackled Repaving U.S. 40 at East St. Louis, Ill. Left, the Batch Man Stood at the Elevation of the Top of the Trucks and Manipulated Extension Levers on the Batchers. Center, the Self-Propelled Fine Grader Removed All Excess Earth from Between the Forms. Right, an Expansion Joint and One of the Blackwell Clamps. See Page 9.

Heavy Grading by John Oman Jr. in Southern Indiana. A 1½-Yard Shovel Loading Rock to a Diesel-Powered Crawler Truck.

Photos by R. W. Kirby

Wagon Drills Sinking Holes for a Big Blast in a Long Ledge on the John Oman Jr. Grading Job on Indiana Route 62. See Page 23.



C. & E. M. Photos

A Pair of Huge Excavators Widening and Deepening the New York Barge Canal near Utica, N.Y. Callahan's 6.6-Yard Monighan Is Shown at the Left and, at the Right, Morrison-Knudsen's 5-Yard Machine. See Page 2.

C. & E. M. Photo

Rolling a Retread Surface to Smoothness in the W. Va. Mountains. See Page 1.

Widening a One-Way Lane Between High Snow Walls on the Road Between Galva and Altona, Ill., Last Winter with a Tractor and Angledozer.

Three of These Outfits Tossed Snow "Over the Fence and Out" in Illinois Last Winter, Helping to Free the Roads from the Bogey of Frozen Snow.

It Was a Case of Pushing the Last Snowfall to the Side, Boosting It Up the 5-Foot Frozen Drifts Made by Earlier Plowing, and Shoving It Over the Top.